

1978



DRINKING WATER SURVEILLANCE PROGRAM

GRAVENHURST WATER TREATMENT PLANT

ANNUAL REPORT 1990

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**GRAVENHURST
WATER TREATMENT PLANT**

DRINKING WATER SURVEILLANCE PROGRAM

ANNUAL REPORT 1990

**HAZARDOUS CONTAMINANTS
COORDINATION BRANCH
135 ST. CLAIR AVENUE WEST
TORONTO, ONTARIO M4V 1P5**

SEPTEMBER 1992



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EXECUTIVE SUMMARY

DRINKING WATER SURVEILLANCE PROGRAM

GRAVENHURST WATER TREATMENT PLANT 1990 ANNUAL REPORT

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 systems were being monitored.

The Gravenhurst water treatment plant is a direct filtration plant which treats water from Lake Muskoka. The process consists of coagulation, flocculation, filtration, pre and post pH adjustment and disinfection. This plant has a rated capacity of $15.0 \times 1000 \text{ m}^3/\text{day}$. The Gravenhurst water treatment plant serves a population of approximately 8,000.

Water at the plant and at one location in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall.

Table A is a summary of all results by group.

No known health related guidelines were exceeded.

The Gravenhurst water treatment plant, for the sample year 1990, produced good quality water and this was maintained in the distribution system.

TABLE A
DRINKING WATER SURVEILLANCE PROGRAM GRAVENHURST WTP

SUMMARY TABLE 'BY SCAN

A POSITIVE VALUE DENOTES THAT THE RESULT IS GREATER THAN THE STATISTICAL LIMIT OF DETECTION AND IS QUANTIFIABLE
A '.' INDICATES THAT NO SAMPLE WAS TAKEN
SITE

SCAN	RAW			TREATED			SITE 1		
	TESTS	POSITIVE	%POSITIVE	TESTS	POSITIVE	%POSITIVE	TESTS	POSITIVE	%POSITIVE
BACTERIOLOGICAL	30	13	43	10	1	10	11	2	18
CHEMISTRY (FLD)	33	33	100	66	66	100	130	130	100
CHEMISTRY (LAB)	231	172	74	231	160	69	395	317	80
METALS	264	70	26	264	73	27	506	157	31
CHLOROAROMATICS	154	0	0	154	0	0	140	0	0
CHLOROPHENOLS	6	0	0	6	0	0	.	.	.
PAH	149	0	0	136	0	0	17	0	0
PESTICIDES & PCB	362	0	0	375	0	0	213	0	0
PHENOLICS	11	0	0	11	1	9	.	.	.
SPECIFIC PESTICIDES	68	0	0	56	0	0	10	0	0
VOLATILES	319	11	3	319	33	10	319	33	10
TOTAL	1627	299		1628	334		1741	639	

DRINKING WATER SURVEILLANCE PROGRAM

GRAVENHURST WATER TREATMENT PLANT 1990 ANNUAL REPORT

INTRODUCTION

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 systems were being monitored.

Appendix A has a full description of the DWSP.

The DWSP was initiated for the Gravenhurst water treatment system in January, 1990. This is the first annual report.

PLANT DESCRIPTION

The Gravenhurst water treatment plant is a direct filtration plant which treats water from Lake Muskoka. The process consists of coagulation, flocculation, filtration, both pre and post pH adjustment and disinfection. This plant has a rated capacity of $15.0 \times 1000 \text{ m}^3/\text{day}$. The Gravenhurst water treatment plant serves a population of approximately 8,000.

The sample day flows ranged from $2.3 \times 1000 \text{ m}^3/\text{day}$ to $4.9 \times 1000 \text{ m}^3/\text{day}$.

General plant information is presented in Table 1 and a schematic of plant processes, chemical addition points and sampling locations in Figure 1.

SAMPLING AND ANALYSES

Sample lines in the plant were flushed prior to sampling to ensure that the water obtained was indicative of its origin and not residual water standing in the sample line.

At all distribution system locations two types of samples were obtained, a standing and a free flow. The standing sample consisted of water that had been in the household plumbing and service connection for a minimum of six hours. These samples were used to make an assessment of the change in the levels of inorganic compounds and metals, due to leaching from, or deposition on, the plumbing system. The only analyses carried out on the standing samples therefore, were General Chemistry and Metals. The free flow

sample represented fresh water from the distribution main, since the sample tap was flushed for five minutes prior to sampling.

Attempts were made to capture the same block of water at each sampling point by taking the retention time into consideration. Retention time was calculated by dividing the volume of water between two sampling points by sample day flow. For example, if it was determined that retention time within the plant was five hours, then there would be a five hour interval between the raw and treated sampling. Similarly, if it was estimated that it took approximately one day for the water to travel from the plant to the distribution system site, this site would be sampled one day after the treated water from the plant.

Stringent DWSP sampling protocols were followed to ensure that all samples were taken in a uniform manner (see Appendix B).

Plant operating personnel routinely analyze parameters for process control (Table 2).

Water at the plant and at one location in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall. Laboratory analyses were conducted at the Ministry of the Environment facilities in Rexdale, Ontario.

RESULTS

Field measurements were recorded on the day of sampling and were entered onto the DWSP database as submitted by plant personnel.

Table 3 contains information on delay time between raw and treated water sampling, flow rate, and treatment chemical dosages.

Table 4 is a summary break-down of the number of water samples analyzed by parameter and by water type. The number of times that a positive or trace result was detected is also reported.

Positive denotes that the result is greater than the statistical limit of detection established by the Ministry of the Environment laboratory staff and is quantifiable. Trace (<T) denotes that the level measured is greater than the lowest value detectable by the method but lies so close to the detection limit that it cannot be confidently quantified.

Table 5 presents the results for parameters detected on at least one occasion.

Table 6 lists all parameters analyzed in the DWSP.

Associated guidelines and detection limits are also supplied on Tables 5 and 6. Parameters are listed alphabetically within each scan.

DISCUSSION

GENERAL

Water quality was judged by comparison with the Ontario Drinking Water Objectives publication (ODWOs). When an Ontario Drinking Water Objective (ODWO) was not available, guidelines/limits from other agencies were used. These guidelines were obtained from the Parameter Listing System database.

IN THIS REPORT, DISCUSSION IS LIMITED TO:

- **THE TREATED AND DISTRIBUTED WATER;**
- **ONLY THOSE PARAMETERS WITH CONCENTRATIONS ABOVE GUIDELINE VALUES; AND**
- **POSITIVE ORGANIC PARAMETERS DETECTED.**

BACTERIOLOGICAL

Guidelines for bacteriological sampling and testing of a supply are developed to maintain a proper supervision of its bacteriological quality. Routine monitoring programs usually require that multiple samples be collected in a given system. Full interpretation of bacteriological quality cannot be made on the basis of single samples.

Standard plate count was the only bacteriological analysis conducted on the treated and distributed water. No results were reported above the guideline.

INORGANIC & PHYSICAL

CHEMISTRY (FIELD)

It is desirable that the temperature of drinking water be less than 15°C. The palatability of water is enhanced by its coolness. A temperature below 15°C will tend to reduce the growth of nuisance organisms and hence minimize associated taste, colour, odour and corrosion problems. The temperature of the delivered water may increase in the distribution system due to the warming effect of the soil in late summer and fall and/or as a result of higher

temperatures in the source water.

Field temperature exceeded the ODWO Maximum Desirable Concentration of 15°C in 1 of 11 treated water samples with a maximum reported value of 18.2°C.

CHEMISTRY (LAB)

Alkalinity was below the ODWO Aesthetic or Recommended Operational Guideline of 30-500 mg/L in 22 of 22 treated and distributed water samples with a maximum reported value of 22.3 mg/L.

METALS

At present, there is no evidence that aluminum is physiologically harmful and no health limit for drinking water has been specified. The measure of aluminum in treated water is important to indicate the efficiency of the treatment process. The ODWOs indicate that a useful guideline is to maintain a residual below 100 ug/L as aluminum in the water leaving the plant, to avoid problems in the distribution system.

Aluminum exceeded the ODWO Aesthetic or Recommended Operational Guideline of 100 ug/L in 17 of 22 treated and distributed water samples with a maximum reported value of 470.0 ug/L.

Lead exceeded the ODWO Maximum Acceptable Concentration of 10.0 ug/L in 1 of 11 treated water samples with a reported value of 57.0 ug/L. The District Officer was notified. Since all other treated water results were less than 1 ug/L and all free-flow distributed water samples had results less than 3 ug/L, this one high result is considered erroneous.

ORGANIC

CHLOROAROMATICS

The results of the chloroaromatic scan showed that none were detected.

CHLOROPHENOLS

The results of the chlorophenol scan showed that none were detected.

POLYAROMATIC HYDROCARBONS (PAH)

The results of the PAH scan showed that none were detected.

PESTICIDES & PCB

The results of the PCB scan showed that none were detected.

The results of the regular pesticide scan showed that none were detected above trace levels.

PHENOLICS

Phenolic compounds are present in the aquatic environment as a result of natural and/or industrial processes. The ODWOs recommend, as an operational guideline, that phenolic substances in drinking water not exceed 2.0 ug/L. This limit has been set primarily to prevent undesirable taste and odours, particularly in chlorinated water. No results exceeded the guideline.

SPECIFIC PESTICIDES

The results of the specific pesticides scan showed that none were detected above trace levels.

VOLATILES

The detection of benzene, ethylbenzene, toluene and xylenes at low, trace levels may be a laboratory artifact derived from the analytical methodology.

Trihalomethanes (THMs) are produced during the water treatment process and will always occur in chlorinated waters. THMs are comprised of chloroform, chlorodibromomethane and dichlorobromomethane; bromoform occurs occasionally. Results are reported for the individual compounds as well as for total THMs. Only total THMs results are discussed.

Total THMs were found at positive levels in the 22 treated and distributed water samples analyzed with a maximum level of 114.8 ug/L. This was below the ODWO Maximum Acceptable Concentration of 350 ug/L.

THMs were also reported in several raw water samples. This indicates that chlorine is mixing with water prior to the raw sample location. Backmixing may occur if the lowlift pumps are not operating. A review of the raw water sampling location may be necessary.

CONCLUSIONS

The Gravenhurst water treatment plant, for the sample year 1990, produced good quality water and this was maintained in the distribution system.

No known health related guidelines were exceeded.

FIGURE 1

GRAVENHURST WTP

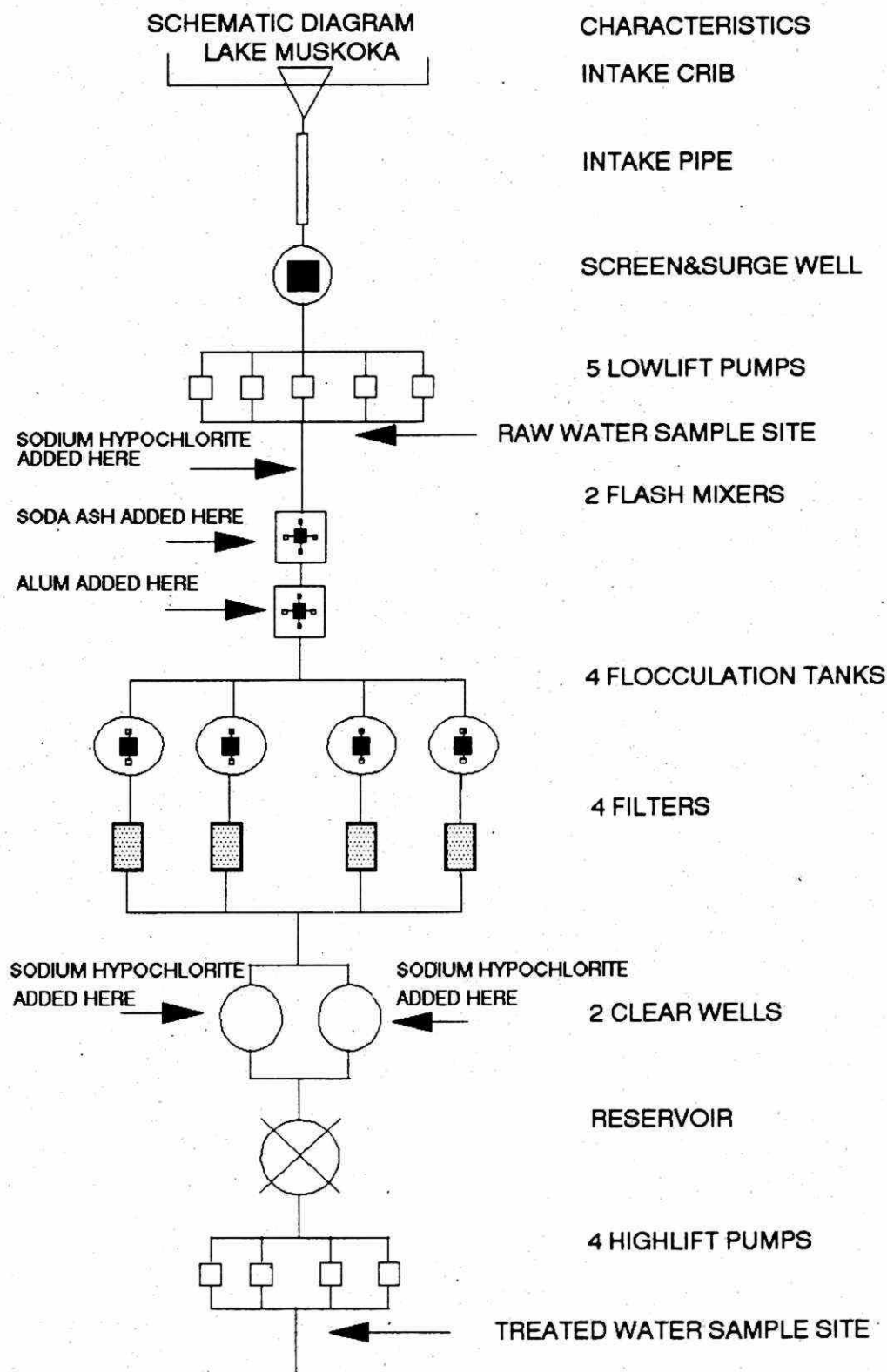


TABLE 1
DRINKING WATER SURVEILLANCE PROGRAM
PLANT GENERAL REPORT

WORKS #: 220002100
PLANT NAME: GRAVENHURST WTP

DISTRICT: MUSKOKA-HALIBURTON
REGION: CENTRAL
DISTRICT OFFICER :T. O'NEILL

UTM #: 176280004979000

PLANT SUPERINTENDENT: HERMAN CLEMENS

ADDRESS: C/O 10 PINE ST
BRACEBRIDGE, ONTARIO
P1L 1N3
(705-645-2231)

MUNICIPALITY: GRAVENHURST
AUTHORITY: MUNICIPAL

PLANT INFORMATION

PLANT VOLUME:	-	(X 1000 M3)
DESIGN CAPACITY:	-	(X 1000 M3/DAY)
RATED CAPACITY:	15.000	(X 1000 M3/DAY)

MUNICIPALITY	POPULATION
-----	-----
GRAVENHURST	8,000

TABLE 2
DRINKING WATER SURVEILLANCE PROGRAM
IN-PLANT MONITORING

<u>PARAMETER</u>	<u>LOCATION</u>	<u>FREQUENCY</u>
ALKALINITY	AFTER FILTERS	EVERY 2 WEEKS
	RAW WATER	EVERY 2 WEEKS
	AFTER SETTLING TANKS	EVERY 2 WEEKS
	TREATED WATER	EVERY 2 WEEKS
ALUMINUM	RAW WATER	WEEKLY
	TREATED WATER	WEEKLY
FREE CHLORINE RESIDUAL	AFTER FILTERS	DAILY
	AFTER SETTLING TANKS	DAILY
	TREATED WATER	DAILY
IRON RESIDUAL	RAW WATER	EVERY 2 WEEKS
	TREATED WATER	EVERY 2 WEEKS
HARDNESS	AFTER FILTERS	EVERY 2 WEEKS
	RAW WATER	EVERY 2 WEEKS
	TREATED WATER	EVERY 2 WEEKS
PH	AFTER FILTERS	DAILY
	RAW WATER	DAILY
	AFTER SETTLING TANKS	DAILY
	TREATED WATER	DAILY
TURBIDITY	AFTER FILTERS	DAILY
	RAW WATER	DAILY
	AFTER SETTLING TANKS	DAILY
	TREATED WATER	DAILY

TABLE 3
DRINKING WATER SURVEILLANCE PROGRAM GRAVENHURST WTP SAMPLE DAY CONDITIONS FOR 1990

TREATMENT CHEMICAL DOSAGE (MG/L)

PRE CHLORINATION	COAGULATION	POST PH ADJUSTMENT	INITIAL PH ADJUSTMENT
SODIUM HYPOCHLORITE	ALUM LIQUID	SODIUM CARBONATE	SODIUM CARBONATE

DATE	DELAY * TIME(HRS)	FLOW (1000M3)				
<hr/>						
FEB 07	12.00	3.125	2.50	12.80	10.00	2.00
MAR 20	10.50	2.319	3.00	12.10	14.70	1.70
APR 18	10.50	3.287	2.37	11.06	13.87	2.74
MAY 22	10.50	2.915	2.70	12.60	13.00	2.70
JUN 19	10.50	4.860	2.80	10.70	12.20	3.40
JUL 17	10.50	3.342	3.00	11.40	15.80	4.30
AUG 21	10.50	4.919	3.00	10.64	15.36	4.14
SEP 18	10.50	2.637	3.20	10.30	22.60	5.40
OCT 16	10.50	2.338	3.07	9.60	11.87	2.85
NOV 20	10.50	2.938	2.30	10.60	9.90	3.00
DEC 18	10.50	2.357	2.21	10.98	11.87	3.42

* THE DELAY TIME BETWEEN THE RAW AND TREATED WATER SAMPLING, SHOULD ESTIMATE THE RETENTION TIME.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM GRAVENHURST WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
BACTERIOLOGICAL									
FECAL COLIFORM MF	10	3	0	.	.	.	.	.	.
STANDRD PLATE CNT MF	.	.	.	10	1	0	11	2	0
TOTAL COLIFORM MF	10	3	0	.	.	.	.	.	.
T COLIFORM BCKGRD MF	10	7	0	.	.	.	.	.	.
*TOTAL GROUP BACTERIOLOGICAL	30	13	0	10	1	0	11	2	0
CHEMISTRY (FLD)									
FLD CHLORINE (COMB)	.	.	.	11	11	0	22	22	0
FLD CHLORINE FREE	.	.	.	11	11	0	22	22	0
FLD CHLORINE (TOTAL)	.	.	.	11	11	0	22	22	0
FLD PH	11	11	0	11	11	0	22	22	0
FLD TEMPERATURE	11	11	0	11	11	0	20	20	0
FLD TURBIDITY	11	11	0	11	11	0	22	22	0
*TOTAL SCAN CHEMISTRY (FLD)	33	33	0	66	66	0	130	130	0
CHEMISTRY (LAB)									
ALKALINITY	11	11	0	11	11	0	22	22	0
CALCIUM	11	11	0	11	11	0	22	22	0
CYANIDE	11	0	1	11	0	1	.	.	.
CHLORIDE	11	11	0	11	11	0	22	22	0
COLOUR	11	11	0	11	5	6	22	8	14
CONDUCTIVITY	11	11	0	11	11	0	22	22	0
DISS ORG CARBON	11	11	0	11	11	0	22	22	0
FLUORIDE	11	1	10	11	0	11	22	0	22
HARDNESS	11	11	0	11	11	0	22	22	0
IONCAL	11	11	0	11	11	0	22	22	0
LANGELIERS INDEX	0	0	0	0	0	0	0	0	0
MAGNESIUM	11	11	0	11	11	0	22	22	0
SODIUM	11	11	0	11	11	0	22	22	0
AMMONIUM TOTAL	11	1	7	11	0	7	22	3	10
NITRITE	11	2	9	11	2	8	22	3	17
TOTAL NITRATES	11	11	0	11	11	0	22	22	0
NITROGEN TOT KJELD	11	11	0	11	10	1	21	19	2
PH	11	11	0	11	11	0	22	22	0
PHOSPHORUS FIL REACT	11	1	5	11	0	1	.	.	.
PHOSPHORUS TOTAL	11	2	9	11	0	4	.	.	.
SULPHATE	11	11	0	11	11	0	22	22	0
TURBIDITY	11	11	0	11	11	0	22	20	2
*TOTAL SCAN CHEMISTRY (LAB)	231	172	41	231	160	39	395	317	67

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM GRAVENHURST WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1	
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE

METALS								
SILVER	11	0	0	11	0	0	22	0
ALUMINUM	11	11	0	11	11	0	22	0
ARSENIC	11	0	8	11	0	7	22	16
BARIUM	11	11	0	11	11	0	22	0
BORON	11	0	11	11	0	11	22	21
BERYLLIUM	11	0	0	11	0	0	22	0
CADMIUM	11	0	2	11	0	3	22	6
COBALT	11	0	11	11	0	11	22	21
CHROMIUM	11	0	1	11	0	0	22	1
COPPER	11	8	3	11	9	2	22	4
IRON	11	1	9	11	0	9	22	18
MERCURY	11	0	0	11	0	0	22	0
MANGANESE	11	11	0	11	11	0	22	0
MOLYBDENUM	11	0	3	11	0	3	22	6
NICKEL	11	0	7	11	0	10	22	17
LEAD	11	4	7	11	7	4	22	2
ANTIMONY	11	0	11	11	0	11	22	19
SELENIUM	11	0	1	11	0	0	22	0
STRONTIUM	11	11	0	11	11	0	22	0
TITANIUM	11	2	9	11	2	9	22	18
THALLIUM	11	0	0	11	0	0	22	0
URANIUM	11	0	0	11	0	0	22	0
VANADIUM	11	0	9	11	0	8	22	11
ZINC	11	11	0	11	11	0	22	1
*TOTAL SCAN METALS	264	70	92	264	73	88	506	161
*TOTAL GROUP INORGANIC & PHYSICAL	528	275	133	561	299	127	1031	228

CHLOROAROMATICS								
HEXACHLOROBUTADIENE	11	0	0	11	0	0	10	0
123 TRICHLOROBENZENE	11	0	0	11	0	0	10	0
1234 T-CHLOROBENZENE	11	0	0	11	0	0	10	0
1235 T-CHLOROBENZENE	11	0	0	11	0	0	10	0
124 TRICHLOROBENZENE	11	0	0	11	0	0	10	0
1245 T-CHLOROBENZENE	11	0	0	11	0	0	10	0
135 TRICHLOROBENZENE	11	0	0	11	0	0	10	0
HCB	11	0	0	11	0	0	10	0
HEXACHLOROETHANE	11	0	0	11	0	0	10	0
OCTACHLOROSTYRENE	11	0	0	11	0	0	10	0
PENTACHLOROBENZENE	11	0	0	11	0	0	10	0
236 TRICHLOROTOLUENE	11	0	0	11	0	0	10	0
245 TRICHLOROTOLUENE	11	0	0	11	0	0	10	0
26A TRICHLOROTOLUENE	11	0	0	11	0	0	10	0
*TOTAL SCAN CHLOROAROMATICS	154	0	0	154	0	0	140	0

CHLOROPHENOLS								

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM GRAVENHURST WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
234 TRICHLOROPHENOL	1	0	0	1	0	0	.	.	.
2345 T-CHLOROPHENOL	1	0	0	1	0	0	.	.	.
2356 T-CHLOROPHENOL	1	0	0	1	0	0	.	.	.
245-TRICHLOROPHENOL	1	0	0	1	0	0	.	.	.
246-TRICHLOROPHENOL	1	0	0	1	0	0	.	.	.
PENTACHLOROPHENOL	1	0	0	1	0	0	.	.	.
*TOTAL SCAN CHLOROPHENOLS	6	0	0	6	0	0	0	0	0

PAH

PHENANTHRENE	9	0	0	8	0	0	1	0	0
ANTHRACENE	8	0	0	8	0	0	1	0	0
FLUORANTHENE	9	0	0	8	0	0	1	0	0
PYRENE	9	0	0	8	0	0	1	0	0
BENZO(A)ANTHRACENE	9	0	0	8	0	0	1	0	0
CHRYSENE	9	0	0	8	0	0	1	0	0
DIMETH. BENZ(A)ANTHR	7	0	0	8	0	0	1	0	0
BENZO(E) PYRENE	9	0	0	8	0	0	1	0	0
BENZO(B) FLUORANTHEN	9	0	0	8	0	0	1	0	0
PERYLENE	9	0	0	8	0	0	1	0	0
BENZO(K) FLUORANTHEN	9	0	0	8	0	0	1	0	0
BENZO(A) PYRENE	8	0	0	8	0	0	1	0	0
BENZO(G,H,I) PERYLEN	9	0	0	8	0	0	1	0	0
DIBENZO(A,H) ANTHRAC	9	0	0	8	0	0	1	0	0
INDENO(1,2,3-C,D) PY	9	0	0	8	0	0	1	0	0
BENZO(B) CHRYSENE	9	0	0	8	0	0	1	0	0
CORONENE	9	0	0	8	0	0	1	0	0
*TOTAL SCAN PAH	149	0	0	136	0	0	17	0	0

PESTICIDES & PCB

ALDRIN	11	0	0	11	0	0	10	0	0
ALPHA BHC	11	0	5	11	0	5	10	0	5
BETA BHC	11	0	0	11	0	0	10	0	0
LINDANE	11	0	0	11	0	0	10	0	0
ALPHA CHLORDANE	11	0	0	11	0	0	10	0	0
GAMMA CHLORDANE	11	0	0	11	0	0	10	0	0
DIELDRIN	11	0	0	11	0	0	10	0	0
METHOXYCHLOR	11	0	0	11	0	0	10	0	0
ENDOSULFAN I	11	0	0	11	0	0	10	0	0
ENDOSULFAN II	11	0	0	11	0	0	10	0	0
ENDRIN	11	0	0	11	0	0	10	0	0
ENDOSULFAN SULPHATE	11	0	0	11	0	0	10	0	0
HEPTACHLOR EPOXIDE	11	0	0	11	0	0	10	0	0
HEPTACHLOR	11	0	0	11	0	0	10	0	0
MIREX	11	0	0	11	0	0	10	0	0
OXYCHLORDANE	11	0	0	11	0	0	10	0	0
OPDDT	11	0	0	11	0	0	10	0	0
PCB	11	0	0	11	0	0	10	0	0
DDD	11	0	0	11	0	0	10	0	0
PPDDE	11	0	0	11	0	0	10	0	0

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM GRAVENHURST WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
PPDOT	11	0	0	11	0	0	10	0	0
AMETRINE	10	0	0	11	0	0	.	.	.
ATRAZINE	10	0	0	11	0	0	.	.	.
ATRATONE	10	0	0	11	0	0	.	.	.
CYAMAZINE (BLADEx)	10	0	0	11	0	0	.	.	.
DESETHYLATRAZINE	10	0	0	11	0	0	.	.	.
D-ETHYL SIMAZINE	8	0	0	9	0	0	.	.	.
PROMETONE	10	0	0	11	0	0	.	.	.
PROPACINE	10	0	0	11	0	0	.	.	.
PROMETRYNE	10	0	0	11	0	0	.	.	.
METRIBUZIN (SENCOR)	10	0	0	11	0	0	.	.	.
SIMAZINE	10	0	0	11	0	0	.	.	.
ALACHLOR (LASSO)	10	0	0	11	0	0	.	.	.
METOLACHLOR	10	0	0	11	0	0	.	.	.
HEXACHLOROCYCLOPENTADIEN	3	0	0	3	0	0	3	0	0

*TOTAL SCAN PESTICIDES & PCB	362	0	5	375	0	5	213	0	5

PHENOLICS									
PHENOLICS	11	0	8	11	1	4	.	.	.

*TOTAL SCAN PHENOLICS	11	0	8	11	1	4	0	0	0

SPECIFIC PESTICIDES									
TOXAPHENE	11	0	0	11	0	0	10	0	0
2,4,5-T	1	0	0	1	0	0	.	.	.
2,4-D	1	0	0	1	0	0	.	.	.
2,4-DB	1	0	0	1	0	0	.	.	.
2,4 D PROPIONIC ACID	1	0	0	1	0	0	.	.	.
DICAMBA	1	0	0	1	0	0	.	.	.
PICHLORAM	0	0	0	0	0	0	.	.	.
SILVEX	1	0	0	1	0	0	.	.	.
DIAZINON	3	0	0	2	0	0	.	.	.
DICHLOROVOS	3	0	0	2	0	0	.	.	.
CHLORPYRIFOS	3	0	0	2	0	0	.	.	.
ETHION	3	0	0	2	0	0	.	.	.
AZINPHOS-METHYL	0	0	0	0	0	0	.	.	.
MALATHION	3	0	0	2	0	0	.	.	.
MEVINPHOS	3	0	0	2	0	0	.	.	.
METHYL PARATHION	3	0	0	2	0	0	.	.	.
METHYLTRITHION	3	0	0	2	0	0	.	.	.
PARATHION	3	0	1	2	0	0	.	.	.
PHORATE	2	0	0	1	0	0	.	.	.
RELDAN	3	0	0	2	0	0	.	.	.
RONNEL	3	0	0	2	0	0	.	.	.
AMINOCARB	0	0	0	0	0	0	.	.	.
BENONYL	0	0	0	0	0	0	.	.	.
BLUX	0	0	0	0	0	0	.	.	.
CARBOFURAN	2	0	0	2	0	0	.	.	.
CICP	2	0	0	2	0	0	.	.	.
DIALATE	2	0	0	2	0	0	.	.	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM GRAVENHURST WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
EPTAM	2	0	0	2	0	0	.	.	.
IPC	2	0	0	2	0	0	.	.	.
PROPOXUR	2	0	0	2	0	0	.	.	.
CARBARYL	2	0	0	2	0	0	.	.	.
BUTYLATE	2	0	0	2	0	0	.	.	.
<hr/>									
*TOTAL SCAN SPECIFIC PESTICIDES	68	0	1	56	0	0	10	0	0
<hr/>									
VOLATILES									
BENZENE	11	0	0	11	0	0	11	0	1
TOLUENE	11	0	0	11	0	0	11	0	1
ETHYLBENZENE	11	0	0	11	0	3	11	0	3
P-XYLENE	11	0	0	11	0	0	11	0	0
M-XYLENE	11	0	0	11	0	0	11	0	1
O-XYLENE	11	0	0	11	0	0	11	0	0
STYRENE	11	0	2	11	0	5	11	0	5
1,1 DICHLOROETHYLENE	11	0	0	11	0	0	11	0	0
METHYLENE CHLORIDE	11	0	0	11	0	0	11	0	0
1,1,2 DICHLOROETHYLENE	11	0	0	11	0	0	11	0	0
1,1 DICHLOROETHANE	11	0	0	11	0	0	11	0	0
CHLOROFORM	11	5	2	11	11	0	11	11	0
111, TRICHLOROETHANE	11	0	1	11	0	0	11	0	0
1,2 DICHLOROETHANE	11	0	0	11	0	0	11	0	0
CARBON TETRACHLORIDE	11	0	0	11	0	0	11	0	0
1,2 DICHLOROPROPANE	11	0	0	11	0	0	11	0	0
TRICHLOROETHYLENE	11	0	0	11	0	0	11	0	0
DICHLOROBROMOMETHANE	11	3	2	11	11	0	11	11	0
112 TRICHLOROETHANE	11	0	0	11	0	0	11	0	0
CHLORODIBROMOMETHANE	11	0	0	11	0	2	11	0	1
T-CHLOROETHYLENE	11	0	0	11	0	0	11	0	1
BROMOFORM	11	0	0	11	0	0	11	0	0
1122 T-CHLOROETHANE	11	0	0	11	0	0	11	0	0
CHLOROBENZENE	11	0	0	11	0	0	11	0	0
1,4 DICHLOROBENZENE	11	0	0	11	0	0	11	0	0
1,3 DICHLOROBENZENE	11	0	0	11	0	0	11	0	0
1,2 DICHLOROBENZENE	11	0	0	11	0	0	11	0	0
ETHYLENE DIBROMIDE	11	0	0	11	0	0	11	0	0
TOTL TRIHALOMETHANES	11	3	2	11	11	0	11	11	0
<hr/>									
*TOTAL SCAN VOLATILES	319	11	9	319	33	10	319	33	13
*TOTAL GROUP ORGANIC	1069	11	23	1057	34	19	699	33	18
<hr/>									

KEY TO TABLE 5 and 6

- A ONTARIO DRINKING WATER OBJECTIVES (ODWO)
1. Maximum Acceptable Concentration (MAC)
1+. MAC for Total Trihalomethanes
2. Interim Maximum Acceptable Concentration (IMAC)
3. Aesthetic Objective (AO)
3+. AO for Total Xylenes
4. Recommended Operational Guideline
- B HEALTH & WELFARE CANADA (H&W)
1. Maximum Acceptable Concentration (MAC)
2. Proposed MAC
3. Interim MAC
4. Aesthetic Objective (AO)
- C WORLD HEALTH ORGANIZATION (WHO)
1. Guideline Value (GV)
2. Tentative GV
3. Aesthetic GV
- D US ENVIRONMENTAL PROTECTION AGENCY (EPA)
1. Maximum Contaminant Level (MCL)
2. Suggested No-Adverse Effect Level (SNAEL)
3. Lifetime Health Advisory
4. EPA Ambient Water Quality Criteria
4T. EPA Ambient Water Quality Criteria for Total PAH
- F EUROPEAN ECONOMIC COMMUNITY (EEC)
1. Health Related Guideline Level
2. Aesthetic Guideline Level
3. Maximum Admissible Concentration (MADC)
- G CALIFORNIA STATE DEPARTMENT OF HEALTH-GUIDELINE VALUE
- I NEW YORK STATE AMBIENT WATER GUIDELINE
- N/A NONE AVAILABLE

LABORATORY RESULTS, REMARK DESCRIPTIONS

.	No Sample Taken
BDL	Below Minimum Measurement Amount
<T	Greater Than Detection Limit But Not Confident (SEE INTERPRETATION OF RESULTS ABOVE)
>	Results Are Greater Than The Upper Limit
<=>	Approximate Result
!CS	No Data: Contamination Suspected
!IL	No Data: Sample Incorrectly Labelled
!IS	No Data: Insufficient Sample
!IV	No Data: Inverted Septum
!LA	No Data: Laboratory Accident
!LD	No Data: Test Queued After Sample Discarded
!NA	No Data: No Authorization To Perform Reanalysis
!NP	No Data: No Procedure
!NR	No Data: Sample Not Received
!OP	No Data: Obscured Plate
!QU	No Data: Quality Control Unacceptable
!PE	No Data: Procedural Error - Sample Discarded
!PH	No Data: Sample pH Outside Valid Range
!RE	No Data: Received Empty
!RO	No Data: See Attached Report (no numeric results)
!SM	No Data: Sample Missing
!SS	No Data: Send Separate Sample Properly Preserved
!UI	No Data: Indeterminant Interference
!TX	No Data: Time Expired
A3C	Approximate, Total Count Exceeded 300 Colonies
APL	Additional Peak, Large, Not Priority Pollutant
APS	Additional Peak, Less Than, Not Priority Pollutant
CIC	Possible Contamination, Improper Cap
CRO	Calculated Result Only
PPS	Test Performed On Preserved Sample
RMP	P and M-Xylene Not Separated
RRV	Rerun Verification
RVU	Reported Value Unusual
SPS	Several Peaks, Small, Not Priority Pollutant

UCR	Unreliable: Could Not Confirm By Reanalysis
UCS	Unreliable: Contamination Suspected
UIN	Unreliable: Indeterminate Interference
XP	Positive After X Number Of Hours
T#	(T06) Result Taken After # Hours

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM GRAVENHURST WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW

TREATED

SITE 1

STANDING

FREE FLOW

BACTERIOLOGICAL		DET'N LIMIT = 0		GUIDELINE = 0 (A1)
FECAL COLIFORM MF (CT/100ML)				
FEB	BDL	.	.	.
MAR	BDL	.	.	.
APR	BDL	.	.	.
MAY	6	.	.	.
JUN	0	.	.	.
JUL	0	.	.	.
SEP	0	.	.	.
OCT	BDL	.	.	.
NOV	2	.	.	.
DEC	1	.	.	.
STANDRD PLATE CNT MF (COUNT /ML)		DET'N LIMIT = 0		GUIDELINE = 500/ML (A3)
FEB	.	9 <=>	.	1 <=>
MAR	.	0 <=>	.	1 <=>
APR	.	0 <=>	.	0 <=>
MAY	.	1 <=>	.	0 <=>
JUN	.	0 <=>	.	17
JUL	.	0 <=>	.	2 <=>
AUG	.	.	.	1 <=>
SEP	.	0 <=>	.	0 <=>
OCT	.	11	.	16
NOV	.	0 <=>	.	3 <=>
DEC	.	0 <=>	.	2 <=>
TOTAL COLIFORM MF (CT/100ML)		DET'N LIMIT = 0		GUIDELINE = 5/100ML(A1)
FEB	9 <=>	.	.	.
MAR	10 <=>	.	.	.
APR	BDL	.	.	.
MAY	10 <=>	.	.	.
JUN	1400	.	.	.
JUL	BDL	.	.	.
SEP	BDL	.	.	.
OCT	20 <=>	.	.	.
NOV	1500	.	.	.
DEC	417	.	.	.
T COLIFORM BCKGRD MF (CT/100ML)		DET'N LIMIT = 0		GUIDELINE = N/A
FEB	191	.	.	.
MAR	60 <=>	.	.	.
APR	48	.	.	.
MAY	3700	.	.	.
JUN	62000	.	.	.
JUL	BDL	.	.	.
SEP	40000 >	.	.	.
OCT	10 <=>	.	.	.
NOV	4200	.	.	.
DEC	2783	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM GRAVENHURST WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW

TREATED

SITE 1

STANDING

FREE FLOW

CHEMISTRY (FLD)				
FLD CHLORINE (COMB) (MG/L)		DET'N LIMIT = 0		GUIDELINE = N/A
FEB	.200	.200	.400	
MAR	.100	.400	.400	
APR	.200	.200	.400	
MAY	.200	.400	.200	
JUN	.050	.200	.400	
JUL	.200	.200	.200	
AUG	.430	.020	.020	
SEP	.200	.200	.200	
OCT	.250	.150	.120	
NOV	.230	.200	.200	
DEC	.300	.200	.200	
FLD CHLORINE FREE (MG/L)		DET'N LIMIT = 0		GUIDELINE = N/A
FEB	.900	.300	.500	
MAR	1.600	.700	1.100	
APR	.900	.100	.300	
MAY	.900	.300	.700	
JUN	.950	.300	.700	
JUL	.900	.500	.700	
AUG	.820	.030	.070	
SEP	1.150	.300	.500	
OCT	.700	.600	.980	
NOV	.720	.300	.500	
DEC	.680	.100	.300	
FLD CHLORINE (TOTAL) (MG/L)		DET'N LIMIT = 0		GUIDELINE = N/A
FEB	1.100	.500	.900	
MAR	1.700	1.100	1.500	
APR	1.100	.300	.700	
MAY	1.100	.700	.900	
JUN	1.000	.500	1.100	
JUL	1.100	.700	.900	
AUG	1.250	.050	.090	
SEP	1.350	.500	.700	
OCT	.950	.750	1.100	
NOV	.950	.500	.700	
DEC	.980	.300	.500	
FLD PH (DMNSLESS)		DET'N LIMIT = N/A		GUIDELINE = 6.5-8.5(A4)
FEB	6.900	7.200	7.400	7.400
MAR	6.800	7.600	7.600	7.400
APR	7.100	7.400	7.600	7.400
MAY	6.800	7.800	7.800	7.600
JUN	7.100	7.800	7.400	7.600
JUL	6.600	7.400	7.200	7.400
AUG	9.200	7.600	7.200	7.400
SEP	6.900	7.300	7.200	7.200
OCT	6.900	7.500	7.500	7.600
NOV	6.950	7.960	7.400	7.600
DEC	7.170	7.830	7.400	7.400

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM GRAVENHURST WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW

TREATED

SITE 1

STANDING

FREE FLOW

FLD TEMPERATURE (DEG.C) DET'N LIMIT = N/A GUIDELINE = 15 (A3)

FEB	1.600	.800	11.000	2.000
MAR	1.600	1.200	9.000	3.000
APR	2.400	3.000	6.000	3.000
MAY	7.300	4.000	4.000	6.000
JUN	11.200	11.000	15.000	9.000
JUL	12.000	11.000	12.000	11.000
AUG	12.600	12.300	.	.
SEP	17.500	18.200	11.200	10.500
OCT	13.600	14.000	16.000	9.500
NOV	6.900	12.200	13.000	14.000
DEC	2.800	7.500	12.200	7.100

FLD TURBIDITY (FTU) DET'N LIMIT = N/A GUIDELINE = 1 (A1)

FEB	.370	.230	.620	.480
MAR	.460	.290	.380	.360
APR	.370	.270	.310	.420
MAY	.680	.150	.280	.310
JUN	.640	.180	.420	.340
JUL	.330	.170	.240	.280
AUG	.470	.100	.240	.300
SEP	.620	.480	.450	.300
OCT	3.200	.240	.230	.250
NOV	.560	.160	.360	.330
DEC	.820	.300	.360	.320

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM GRAVENHURST WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED		SITE 1	
		STANDING		FREE FLOW	

CHEMISTRY (LAB)					
ALKALINITY (MG/L)		DET'N LIMIT = 0.2		GUIDELINE = 30-500 (A3)	
FEB	8.100	15.900	17.200	15.900	
MAR	8.900	17.200	16.700	16.700	
APR	7.100	16.600	16.100	16.300	
MAY	6.800	18.900	19.100	19.700	
JUN	6.900	17.000	16.900	16.300	
JUL	6.300	21.400	21.000	20.300	
AUG	49.200	20.100	21.200	22.300	
SEP	10.100	20.000	19.500	19.100	
OCT	9.200	16.500	17.100	17.700	
NOV	8.700	16.200	17.100	16.000	
DEC	12.200	14.800	15.100	14.600	

CALCIUM (MG/L)		DET'N LIMIT = 0.2		GUIDELINE = 100 (F2)	
FEB	5.000	5.200	5.000	5.200	
MAR	3.400	3.800	3.600	3.400	
APR	4.100	4.000	4.200	4.200	
MAY	4.400	4.600	4.930	5.800	
JUN	4.000	4.400	3.800	3.800	
JUL	4.700	4.400	4.000	4.300	
AUG	4.600	4.400	4.400	4.600	
SEP	4.400	4.600	4.800	4.600	
OCT	6.210	4.600	4.200	4.300	
NOV	3.800	4.800	5.100	5.320	
DEC	7.200	5.800	6.000	5.400	

CYANIDE (MG/L)		DET'N LIMIT = 0.001		GUIDELINE = .2 (A1)	
FEB	BDL	BDL	.	.	
MAR	BDL	BDL	.	.	
APR	.003 <T	.002 <T	.	.	
MAY	BDL	BDL	.	.	
JUN	BDL	BDL	.	.	
JUL	BDL	BDL	.	.	
AUG	BDL	BDL	.	.	
SEP	BDL	BDL	.	.	
OCT	BDL	BDL	.	.	
NOV	BDL	BDL	.	.	
DEC	BDL	BDL	.	.	

CHLORIDE (MG/L)		DET'N LIMIT = 0.2		GUIDELINE = 250 (A3)	
FEB	5.000	7.100	7.500	7.100	
MAR	4.700	7.100	7.400	7.200	
APR	4.600	6.500	6.700	6.500	
MAY	4.300	6.600	6.700	6.600	
JUN	4.500	7.200	7.500	7.400	
JUL	5.400	6.200	6.400	6.300	
AUG	4.700	6.600	6.800	7.000	
SEP	4.800	7.100	7.300	7.200	
OCT	4.900	7.000	7.000	7.000	
NOV	4.300	6.200	6.200	6.900	
DEC	4.000	6.400	6.500	6.400	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM GRAVENHURST WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED		SITE 1	
		STANDING		FREE FLOW	
COLOUR (NZU)		DET'N LIMIT = 0.5		GUIDELINE = 5 (A3)	
FEB	13.000	2.500	3.000	2.500	
MAR	13.500	2.000 <T	2.000 <T	2.000 <T	
APR	13.000	2.000 <T	2.000 <T	2.000 <T	
MAY	14.000	2.000 <T	2.000 <T	1.500 <T	
JUN	14.500	2.500	2.000 <T	2.000 <T	
JUL	8.500	2.500	3.000	2.500	
AUG	15.000	1.500 <T	2.000 <T	1.500 <T	
SEP	7.000	3.000	3.500	3.500	
OCT	9.500	2.500	2.500	2.500	
NOV	12.000	2.000 <T	2.000 <T	1.500 <T	
DEC	12.500	1.500 <T	2.000 <T	1.000 <T	
CONDUCTIVITY (UMHO/CM)		DET'N LIMIT = 1.		GUIDELINE = 400 (F2)	
FEB	57	92	96	91	
MAR	60	94	94	94	
APR	54	92	91	91	
MAY	52	94	95	96	
JUN	53	90	92	90	
JUL	59	98	98	96	
AUG	131	96	98	100	
SEP	59	97	95	94	
OCT	61	93	92	93	
NOV	56	90	92	90	
DEC	62	90	90	88	
DISS ORG CARBON (MG/L)		DET'N LIMIT = .100		GUIDELINE = 5.0 (A3)	
FEB	3.500	2.300	2.800	2.500	
MAR	3.400	2.400	2.400	2.300	
APR	3.200	2.000	2.000	2.000	
MAY	3.200	2.100	2.100	2.000	
JUN	3.300	2.500	2.400	2.300	
JUL	3.300	2.200	2.100	2.100	
AUG	3.400	2.100	2.000	2.100	
SEP	3.400	3.000	3.000	3.000	
OCT	2.900	2.800	2.900	2.800	
NOV	3.200	2.100	2.100	2.100	
DEC	3.300	2.100	2.200	2.200	
FLUORIDE (MG/L)		DET'N LIMIT = 0.01		GUIDELINE = 2.4 (A1)	
FEB	.040 <T	.020 <T	.020 <T	.020 <T	
MAR	.040 <T	.040 <T	.040 <T	.040 <T	
APR	.040 <T	.020 <T	.040 <T	.020 <T	
MAY	.040 <T	.020 <T	.020 <T	.020 <T	
JUN	.040 <T	.040 <T	.040 <T	.040 <T	
JUL	.040 <T	.040 <T	.040 <T	.040 <T	
AUG	.040 <T	.020 <T	.020 <T	.040 <T	
SEP	.040 <T	.040 <T	.040 <T	.040 <T	
OCT	.040 <T	.020 <T	.020 <T	.020 <T	
NOV	.040 <T	.020 <T	.020 <T	.020 <T	
DEC	.060	.040 <T	.040 <T	.040 <T	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM GRAVENHURST WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW

TREATED

SITE 1

STANDING

FREE FLOW

HARDNESS (MG/L)		DET'N LIMIT = 0.5		GUIDELINE = 80-100 (A4)
FEB	18.000	18.000	18.000	13.000
MAR	14.000	15.000	14.000	14.000
APR	15.100	14.400	15.100	15.000
MAY	15.000	16.000	16.000	19.500
JUN	14.000	15.000	15.000	14.000
JUL	15.800	15.600	14.700	15.000
AUG	16.000	15.000	15.000	16.000
SEP	16.000	17.000	17.000	16.000
OCT	20.000	17.000	15.000	15.000
NOV	14.000	17.000	17.500	17.800
DEC	23.000	19.000	20.000	18.000
IONCAL (DMNSLESS)		DET'N LIMIT = N/A		GUIDELINE = N/A
FEB	8.495	5.050	2.151	5.893
MAR	11.120	2.257	1.541	1.934
APR	.052	4.182	2.007	2.086
MAY	1.694	3.645	5.870	.342
JUN	4.200	1.908	4.472	1.767
JUL	10.460	6.546	.908	2.123
AUG	2.226	.243	.546	2.705
SEP	3.101	4.855	2.119	2.439
OCT	6.402	3.390	1.152	1.020
NOV	8.282	.976	1.243	1.139
DEC	7.897	2.718	2.141	1.336
LANGELIERS INDEX (DMNSLESS)		DET'N LIMIT = N/A		GUIDELINE = N/A
FEB	-2.570	-1.926	-1.921	-1.956
MAR	-2.648	-1.929	-2.056	-2.081
APR	-2.853	-2.022	-2.053	-2.008
MAY	-2.900	-1.606	-1.531	-1.378
JUN	-2.805	-1.819	-1.926	-1.981
JUL	-2.877	-1.663	-1.712	-1.745
AUG	-.007	-1.729	-1.727	-1.486
SEP	-2.381	-1.922	-2.104	-2.041
OCT	-2.493	-1.964	-2.008	-1.933
NOV	-2.538	-1.822	-1.783	-1.823
DEC	-1.827	-1.999	-1.936	-2.085
MAGNESIUM (MG/L)		DET'N LIMIT = 0.1		GUIDELINE = 30 (F2)
FEB	1.300	1.200	1.300	1.300
MAR	1.200	1.300	1.300	1.300
APR	1.200	1.050	1.150	1.100
MAY	.900	1.200	.900	1.200
JUN	1.100	1.000	1.300	1.200
JUL	1.050	1.100	1.100	1.050
AUG	1.100	1.000	1.100	1.100
SEP	1.200	1.300	1.100	1.200
OCT	1.200	1.250	1.100	1.050
NOV	1.200	1.000	1.150	1.050
DEC	1.100	1.200	1.100	1.100

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM GRAVENHURST WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED		SITE 1	
		STANDING		FREE FLOW	
SODIUM (MG/L)		DET'N LIMIT = 0.2		GUIDELINE = 200 (A4)	
FEB	3.800	11.000	11.400	11.000	
MAR	3.400	11.800	11.400	11.400	
APR	3.400	11.300	11.300	11.200	
MAY	3.200	11.400	11.400	11.000	
JUN	3.100	11.500	11.500	11.600	
JUL	4.600	14.400	13.800	13.300	
AUG	23.400	13.000	13.200	13.200	
SEP	4.000	13.000	12.400	12.200	
OCT	4.200	11.300	11.900	11.800	
NOV	3.400	10.400	10.100	10.000	
DEC	3.000	9.200	9.200	9.400	
AMMONIUM TOTAL (MG/L)		DET'N LIMIT = 0.002		GUIDELINE = 0.05 (F2)	
FEB	.008 <T	BDL	.058	BDL	
MAR	BDL	BDL	BDL	BDL	
APR	BDL	BDL	BDL	BDL	
MAY	.006 <T	.002 <T	.004 <T	.004 <T	
JUN	.014	BDL	BDL	BDL	
JUL	.006 <T	.004 <T	.006 <T	.006 <T	
AUG	.008 <T	.002 <T	.006 <T	BDL	
SEP	BDL	.004 <T	.004 <T	BDL	
OCT	.008 <T	.008 <T	.010	.008 <T	
NOV	.002 <T	.006 <T	.004 <T	.020	
DEC	.006 <T	.002 <T	.004 <T	.002 <T	
NITRITE (MG/L)		DET'N LIMIT = 0.001		GUIDELINE = 1 (A1)	
FEB	.006	.005	.005	.004 <T	
MAR	.004 <T	.002 <T	.002 <T	.002 <T	
APR	.004 <T	.002 <T	.002 <T	.002 <T	
MAY	.002 <T	.001 <T	.001 <T	.001 <T	
JUN	.004 <T	.003 <T	.003 <T	.003 <T	
JUL	.003 <T	.005	.004 <T	.005	
AUG	.005	.002 <T	.002 <T	.001 <T	
SEP	.002 <T	.004 <T	.004 <T	.001 <T	
OCT	.003 <T	.002 <T	.002 <T	.002 <T	
NOV	.002 <T	.002 <T	.001 <T	.006	
DEC	.001 <T	BDL	BDL	BDL	
TOTAL NITRATES (MG/L)		DET'N LIMIT = 0.005		GUIDELINE = 10 (A1)	
FEB	.260	.260	.265	.260	
MAR	.290	.290	.290	.290	
APR	.290	.290	.290	.285	
MAY	.280	.275	.275	.275	
JUN	.285	.285	.275	.260	
JUL	.295	.290	.290	.290	
AUG	.300	.300	.310	.295	
SEP	.115	.100	.100	.090	
OCT	.180	.160	.170	.160	
NOV	.220	.210	.205	.210	
DEC	.200	.205	.200	.200	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM GRAVENHURST WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW

TREATED

SITE 1

STANDING

FREE FLOW

NITROGEN TOT KJELD (MG/L)		DET'N LIMIT = 0.02		GUIDELINE = N/A
FEB	.220	.160	.430	.160
MAR	.270	.190	.200	.190
APR	.320	.160	.180	.170
MAY	.240	.110	.110	.110
JUN	.280	.140	.180	.160
JUL	.190	.120	.130	.120
AUG	.190	.090 <T	.080 <T	.090 <T
SEP	.250	.260	.210	.270
OCT	.350	.160	.170	.150
NOV	.210	.110	.110	ISM
DEC	.220	.130	.130	.120
PH (DMNSLESS)		DET'N LIMIT = N/A		GUIDELINE = 6.5-8.5(A4)
FEB	7.160	7.510	7.500	7.480
MAR	7.210	7.610	7.520	7.520
APR	7.020	7.510	7.470	7.510
MAY	6.960	7.810	7.850	7.920
JUN	7.090	7.660	7.620	7.580
JUL	6.990	7.720	7.720	7.670
AUG	9.010	7.680	7.660	7.860
SEP	7.310	7.470	7.280	7.370
OCT	7.090	7.510	7.490	7.540
NOV	7.280	7.640	7.630	7.600
DEC	7.570	7.420	7.460	7.370
PHOSPHORUS FIL REACT (MG/L)		DET'N LIMIT = 0.0005		GUIDELINE = N/A
FEB	.000 <T	BDL	.	.
MAR	BDL	BDL	.	.
APR	BDL	BDL	.	.
MAY	.001 <T	.000 <T	.	.
JUN	.000 <T	BDL	.	.
JUL	BDL	BDL	.	.
AUG	.003	BDL	.	.
SEP	BDL	BDL	.	.
OCT	.001 <T	BDL	.	.
NOV	.000 <T	BDL	.	.
DEC	BDL	BDL	.	.
PHOSPHORUS TOTAL (MG/L)		DET'N LIMIT = 0.002		GUIDELINE = .40 (F2)
FEB	.005 <T	.002 <T	.	.
MAR	.006 <T	.003 <T	.	.
APR	.003 <T	BDL	.	.
MAY	.004 <T	BDL	.	.
JUN	.010	BDL	.	.
JUL	.006 <T	BDL	.	.
AUG	.005 <T	BDL	.	.
SEP	.007 <T	.003 <T	.	.
OCT	.112	BDL	.	.
NOV	.005 <T	BDL	.	.
DEC	.006 <T	.002 <T	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM GRAVENHURST WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED	SITE 1	
		STANDING	FREE FLOW	
SULPHATE (MG/L)		DET'N LIMIT = .200		GUIDELINE = 500 (A3)
FEB	7.680	12.470	12.680	12.540
MAR	6.310	10.900	11.100	11.030
APR	7.620	13.160	13.450	13.160
MAY	7.850	12.980	13.120	12.950
JUN	7.620	12.190	12.640	12.180
JUL	8.300	12.270	13.330	12.350
AUG	7.780	12.280	12.080	12.180
SEP	7.780	12.160	11.950	11.870
OCT	10.630	12.420	12.370	12.500
NOV	7.760	12.880	12.820	12.850
DEC	8.020	13.280	13.170	13.070
TURBIDITY (FTU)		DET'N LIMIT = 0.05		GUIDELINE = 1 (A1)
FEB	.380	.710	1.200	2.000
MAR	.660	.400	.680	.490
APR	.620	.520	.710	.480
MAY	.970	.680	.740	.520
JUN	.840	.390	.670	.210 <T
JUL	1.100	.360	.450	.330
AUG	.700	.290	.220 <T	.300
SEP	.910	.680	.990	.770
OCT	9.200	.370	.450	.290
NOV	.930	.320	.440	.380
DEC	.870	.400	.380	.370

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM GRAVENHURST WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED		SITE 1	
		STANDING		FREE FLOW	

METALS					
ALUMINUM (UG/L)		DET'N LIMIT = 0.10		GUIDELINE = 100 (A4)	
FEB	27.000	140.000	140.000	180.000	
MAR	86.000	180.000	180.000	180.000	
APR	27.000	150.000	130.000	150.000	
MAY	55.000	110.000	39.000	110.000	
JUN	37.000	150.000	130.000	100.000	
JUL	160.000	120.000	62.000	94.000	
AUG	88.000	63.000	80.000	80.000	
SEP	59.000	370.000	420.000	470.000	
OCT	140.000	230.000	240.000	250.000	
NOV	18.000	110.000	98.000	98.000	
DEC	22.000	150.000	130.000	150.000	

ARSENIC (UG/L)		DET'N LIMIT = 0.10		GUIDELINE = 25 (A1)	
FEB	.210 <T	BDL	.210 <T	.150 <T	
MAR	.170 <T	BDL	BDL	.120 <T	
APR	BDL	.110 <T	.110 <T	BDL	
MAY	.180 <T	.130 <T	BDL	.160 <T	
JUN	.150 <T	BDL	BDL	.140 <T	
JUL	.250 <T	.220 <T	.180 <T	.160 <T	
AUG	BDL	.170 <T	.120 <T	.120 <T	
SEP	BDL	BDL	BDL	.230 <T	
OCT	.240 <T	.270 <T	.210 <T	BDL	
NOV	.210 <T	.250 <T	.350 <T	.210 <T	
DEC	.230 <T	.130 <T	.120 <T	.170 <T	

BARIUM (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 1000 (A2)	
FEB	18.000	17.000	17.000	17.000	
MAR	17.000	17.000	17.000	17.000	
APR	16.000	16.000	16.000	16.000	
MAY	17.000	18.000	16.000	18.000	
JUN	17.000	16.000	16.000	16.000	
JUL	17.000	16.000	17.000	16.000	
AUG	14.000	17.000	17.000	17.400	
SEP	16.000	15.000	16.000	17.000	
OCT	17.000	17.000	18.000	15.000	
NOV	16.000	16.000	16.000	17.000	
DEC	17.000	16.000	17.000	16.000	

BORON (UG/L)		DET'N LIMIT = 2.00		GUIDELINE = 5000 (A1)	
FEB	14.000 <T	7.200 <T	7.900 <T	6.900 <T	
MAR	7.100 <T	7.100 <T	6.800 <T	6.700 <T	
APR	8.700 <T	7.700 <T	6.900 <T	7.600 <T	
MAY	11.000 <T	16.000 <T	23.000	12.000 <T	
JUN	6.700 <T	7.100 <T	8.300 <T	7.100 <T	
JUL	6.800 <T	6.000 <T	6.900 <T	8.200 <T	
AUG	8.300 <T	7.400 <T	7.100 <T	7.140 <T	
SEP	8.100 <T	8.400 <T	8.600 <T	8.700 <T	
OCT	6.100 <T	6.800 <T	6.800 <T	6.300 <T	
NOV	6.300 <T	5.800 <T	5.700 <T	5.300 <T	
DEC	6.700 <T	6.800 <T	6.800 <T	6.800 <T	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM GRAVENHURST WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW

TREATED

SITE 1

STANDING

FREE FLOW

CADMIUM (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 5 (A1)
FEB	.100 <T	BDL	.760	.080 <T
MAR	BDL	BDL	.090 <T	BDL
APR	BDL	.070 <T	.120 <T	BDL
MAY	.100 <T	.120 <T	.100 <T	BDL
JUN	BDL	BDL	.060 <T	BDL
JUL	BDL	.140 <T	BDL	BDL
AUG	BDL	BDL	BDL	BDL
SEP	BDL	BDL	.270 <T	BDL
OCT	BDL	BDL	BDL	BDL
NOV	BDL	BDL	BDL	BDL
DEC	BDL	BDL	BDL	BDL
COBALT (UG/L)		DET'N LIMIT = 0.02		GUIDELINE = N/A
FEB	.100 <T	.140 <T	.100 <T	.100 <T
MAR	.050 <T	.080 <T	.150 <T	.090 <T
APR	.080 <T	.090 <T	.090 <T	.070 <T
MAY	.060 <T	.080 <T	BDL	.120 <T
JUN	.100 <T	.070 <T	.090 <T	.070 <T
JUL	.080 <T	.090 <T	.070 <T	.070 <T
AUG	.100 <T	.090 <T	.050 <T	.050 <T
SEP	.070 <T	.100 <T	.080 <T	.100 <T
OCT	.140 <T	.120 <T	.110 <T	.130 <T
NOV	.070 <T	.080 <T	.060 <T	.060 <T
DEC	.080 <T	.090 <T	.070 <T	.100 <T
CHROMIUM (UG/L)		DET'N LIMIT = 0.50		GUIDELINE = 50 (A1)
FEB	.730 <T	BDL	BDL	BDL
MAR	BDL	BDL	BDL	BDL
APR	BDL	BDL	BDL	BDL
MAY	BDL	BDL	BDL	BDL
JUN	BDL	BDL	BDL	BDL
JUL	BDL	BDL	BDL	BDL
AUG	BDL	BDL	BDL	BDL
SEP	BDL	BDL	BDL	.680 <T
OCT	BDL	BDL	BDL	BDL
NOV	BDL	BDL	BDL	BDL
DEC	BDL	BDL	BDL	BDL
COPPER (UG/L)		DET'N LIMIT = 0.50		GUIDELINE = 1000 (A3)
FEB	21.000	19.000	120.000	9.000
MAR	4.200 <T	2.800 <T	38.000	5.100
APR	9.000	7.900	120.000	5.700
MAY	11.000	7.900	11.000	3.200 <T
JUN	6.900	10.000	64.000	4.600 <T
JUL	12.000	7.000	270.000	7.300
AUG	5.000 <T	16.000	9.200	9.190
SEP	6.600	15.000	170.000	7.900
OCT	66.000	7.000	23.000	21.000
NOV	5.100	18.000	100.000	4.400 <T
DEC	4.200 <T	3.800 <T	63.000	2.900 <T

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM GRAVENHURST WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED		SITE 1	
		STANDING		FREE FLOW	
IRON (UG/L)		DET'N LIMIT = 6.00		GUIDELINE = 300 (A3)	
FEB	35.000 <T	9.200 <T	7.500 <T	11.000 <T	
MAR	35.000 <T	7.400 <T	10.000 <T	26.000 <T	
APR	29.000 <T	8.000 <T	7.100 <T	6.100 <T	
MAY	36.000 <T	15.000 <T	BDL	BDL	
JUN	49.000 <T	14.000 <T	7.400 <T	BDL	
JUL	19.000 <T	BDL	BDL	14.000 <T	
AUG	BDL	BDL	7.200 <T	7.240 <T	
SEP	22.000 <T	11.000 <T	7.000 <T	20.000 <T	
OCT	120.000	23.000 <T	13.000 <T	14.000 <T	
NOV	32.000 <T	16.000 <T	10.000 <T	7.700 <T	
DEC	45.000 <T	22.000 <T	11.000 <T	12.000 <T	
MANGANESE (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 50 (A3)	
FEB	6.800	2.400	2.500	2.400	
MAR	4.500	1.600	1.500	1.700	
APR	5.900	3.000	3.000	2.600	
MAY	12.000	4.700	1.700	3.100	
JUN	16.000	1.400	1.100	.840	
JUL	4.900	1.100	1.300	.890	
AUG	6.600	2.100	1.300	1.330	
SEP	12.000	1.600	.980	1.200	
OCT	29.000	1.900	1.800	1.500	
NOV	7.900	1.200	1.300	.880	
DEC	7.400	1.300	.910	1.100	
MOLYBDENUM (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = N/A	
FEB	.100 <T	BDL	BDL	BDL	
MAR	.080 <T	BDL	BDL	.060 <T	
APR	BDL	BDL	BDL	BDL	
MAY	BDL	.060 <T	.200 <T	.060 <T	
JUN	BDL	.060 <T	BDL	BDL	
JUL	.060 <T	BDL	BDL	.070 <T	
AUG	BDL	BDL	BDL	BDL	
SEP	BDL	BDL	BDL	.080 <T	
OCT	BDL	BDL	BDL	BDL	
NOV	BDL	.060 <T	.060 <T	BDL	
DEC	BDL	BDL	BDL	BDL	
NICKEL (UG/L)		DET'N LIMIT = 0.20		GUIDELINE = 350 (D3)	
FEB	BDL	.290 <T	1.800 <T	BDL	
MAR	BDL	BDL	.780 <T	BDL	
APR	.420 <T	.390 <T	.530 <T	.330 <T	
MAY	.470 <T	.630 <T	BDL	BDL	
JUN	.430 <T	.490 <T	2.100	.220 <T	
JUL	.240 <T	.320 <T	1.700 <T	.310 <T	
AUG	BDL	.760 <T	.370 <T	.370 <T	
SEP	.210 <T	.430 <T	1.800 <T	.540 <T	
OCT	.450 <T	.440 <T	1.300 <T	.370 <T	
NOV	BDL	.470 <T	.580 <T	.650 <T	
DEC	.410 <T	.310 <T	.280 <T	.380 <T	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM GRAVENHURST WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW

TREATED

SITE 1

STANDING

FREE FLOW

LEAD (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 10. (A1)
FEB	.940	.680	40.000	2.900
MAR	.340 <T	.110 <T	7.600	.610
APR	.670	.230 <T	10.000	.680
MAY	1.000	.550	.930	.470 <T
JUN	.370 <T	.760	7.100	.690
JUL	.360 <T	57.000	3.800	1.300
AUG	.240 <T	.530	1.300	1.300
SEP	.270 <T	.810	8.500	1.200
OCT	1.800	.910	2.100	.520
NOV	.180 <T	.360 <T	2.000	.480 <T
DEC	.190 <T	.250 <T	3.300	.520
ANTIMONY (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 146 (D4)
FEB	.500 <T	.370 <T	.440 <T	.410 <T
MAR	.310 <T	.250 <T	.320 <T	.530
APR	.330 <T	.200 <T	.210 <T	.240 <T
MAY	.180 <T	.160 <T	.390 <T	.280 <T
JUN	.370 <T	.380 <T	.490 <T	.340 <T
JUL	.500 <T	.410 <T	.520	.680
AUG	.260 <T	.330 <T	.360 <T	.360 <T
SEP	.410 <T	.340 <T	.390 <T	.320 <T
OCT	.200 <T	.370 <T	.470 <T	.380 <T
NOV	.340 <T	.390 <T	.370 <T	.390 <T
DEC	.380 <T	.460 <T	.500 <T	.480 <T
SELENIUM (UG/L)		DET'N LIMIT = 1.00		GUIDELINE = 10 (A1)
FEB	BDL	BDL	BDL	BDL
MAR	BDL	BDL	BDL	BDL
APR	BDL	BDL	BDL	BDL
MAY	BDL	BDL	BDL	BDL
JUN	BDL	BDL	BDL	BDL
JUL	BDL	BDL	BDL	BDL
AUG	BDL	BDL	BDL	BDL
SEP	1.100 <T	BDL	BDL	BDL
OCT	BDL	BDL	BDL	BDL
NOV	BDL	BDL	BDL	BDL
DEC	BDL	BDL	BDL	BDL
STRONTIUM (UG/L)		DET'N LIMIT = 0.10		GUIDELINE = N/A
FEB	37.000	36.000	35.000	35.000
MAR	36.000	34.000	34.000	32.000
APR	34.000	33.000	32.000	32.000
MAY	33.000	33.000	33.000	34.000
JUN	32.000	31.000	31.000	32.000
JUL	33.000	32.000	32.000	33.000
AUG	28.000	33.000	32.000	31.900
SEP	38.000	34.000	34.000	34.000
OCT	33.000	34.000	35.000	33.000
NOV	36.000	31.000	30.000	30.000
DEC	33.000	33.000	32.000	32.000

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM GRAVENHURST WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

		RAW	TREATED	SITE 1	
				STANDING	FREE FLOW
TITANIUM (UG/L)				DET'N LIMIT = 0.50	GUIDELINE = N/A
FEB	4.200 <T	3.700 <T	3.900 <T	4.300 <T	
MAR	3.000 <T	2.800 <T	3.500 <T	3.800 <T	
APR	3.500 <T	3.200 <T	3.900 <T	3.000 <T	
MAY	4.100 <T	3.700 <T	3.200 <T	3.600 <T	
JUN	8.300	7.600	7.400	7.900	
JUL	2.700 <T	2.000 <T	2.300 <T	2.100 <T	
AUG	5.200	5.900	6.400	6.390	
SEP	4.200 <T	3.800 <T	3.700 <T	4.200 <T	
OCT	3.300 <T	2.400 <T	2.300 <T	2.100 <T	
NOV	4.500 <T	4.500 <T	4.100 <T	4.300 <T	
DEC	3.000 <T	2.900 <T	2.900 <T	3.100 <T	
VANADIUM (UG/L)				DET'N LIMIT = 0.05	GUIDELINE = N/A
FEB	.080 <T	.320 <T	.380 <T	.350 <T	
MAR	.110 <T	.400 <T	.380 <T	.400 <T	
APR	.080 <T	.140 <T	.170 <T	.110 <T	
MAY	.060 <T	BDL	BDL	BDL	
JUN	.100 <T	.070 <T	.090 <T	BDL	
JUL	.210 <T	.220 <T	.160 <T	.170 <T	
AUG	.060 <T	.070 <T	BDL	BDL	
SEP	.080 <T	.100 <T	.080 <T	.070 <T	
OCT	.090 <T	.060 <T	BDL	BDL	
NOV	BDL	BDL	BDL	BDL	
DEC	BDL	BDL	BDL	BDL	
ZINC (UG/L)				DET'N LIMIT = 0.20	GUIDELINE = 5000 (A3)
FEB	9.700	6.600	34.000	7.400	
MAR	5.600	4.600	10.000	5.200	
APR	7.100	5.600	13.000	5.300	
MAY	7.800	5.700	1.700 <T	3.600	
JUN	7.100	7.500	19.000	4.600	
JUL	9.500	5.200	19.000	4.500	
AUG	11.000	6.900	6.500	6.490	
SEP	4.300	4.500	17.000	3.300	
OCT	11.000	8.000	13.000	6.000	
NOV	6.400	6.300	10.000	5.800	
DEC	5.200	4.300	8.200	3.800	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM GRAVENHURST WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW

TREATED

SITE 1

STANDING

FREE FLOW

PESTICIDES & PCB		DET'N LIMIT = 1.000		GUIDELINE = 700 (G)	
ALPHA BHC (NG/L)					
FEB	BDL	BDL	.	BDL	
MAR	2.000 <T	1.000 <T	.	1.000 <T	
APR	BDL	BDL	.	BDL	
MAY	1.000 <T	BDL	.	!NR	
JUN	BDL	BDL	.	BDL	
JUL	1.000 <T	3.000 <T	.	1.000 <T	
AUG	1.000 <T	2.000 <T	.	1.000 <T	
SEP	BDL	1.000 <T	.	1.000 <T	
OCT	BDL	BDL	.	BDL	
NOV	1.000 <T	1.000 <T	.	1.000 <T	
DEC	BDL	BDL	.	BDL	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM GRAVENHURST WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW

TREATED

SITE 1

STANDING

FREE FLOW

PHENOLICS		PHENOLICS		DET'N LIMIT = .200	GUIDELINE = 2	(A4)
PHENOLICS (UG/L)					
FEB	.400 <T	.400 <T	.	.	.	.
MAR	.800 <T	.600 <T	.	.	.	.
APR	.400 <T	BDL	.	.	.	.
MAY	BDL	BDL	.	.	.	.
JUN	BDL	BDL	.	.	.	.
JUL	.400 <T	.400 <T	.	.	.	.
AUG	.400 <T	BDL	.	.	.	.
SEP	BDL	BDL	.	.	.	.
OCT	.600 <T	BDL	.	.	.	.
NOV	.600 <T	1.000	.	.	.	.
DEC	.800 <T	.800 <T	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM GRAVENHURST WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW

TREATED

SITE 1

STANDING

FREE FLOW

SPECIFIC PESTICIDES

PARATHION (NG/L)

DET'N LIMIT = 20.

GUIDELINE = 50000 (A1)

JUN
OCT
DEC

BDL
180,000 <T
BDL

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BDL
BDL

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TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM GRAVENHURST WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW

TREATED

SITE 1

STANDING

FREE FLOW

VOLATILES			
BENZENE (UG/L)	)	DET'N LIMIT = 0.05	GUIDELINE = 5 (A1)
FEB	BDL	BDL	.200 <T
MAR	BDL	BDL	BDL
APR	BDL	BDL	BDL
MAY	BDL	BDL	BDL
JUN	BDL	BDL	BDL
JUL	BDL	BDL	BDL
AUG	BDL	BDL	BDL
SEP	BDL	BDL	BDL
OCT	BDL	BDL	BDL
NOV	BDL	BDL	BDL
DEC	BDL	BDL	BDL
TOLUENE (UG/L)	)	DET'N LIMIT = 0.05	GUIDELINE = 24 (A3)
FEB	BDL	BDL	.150 <T
MAR	BDL	BDL	BDL
APR	BDL	BDL	BDL
MAY	BDL	BDL	BDL
JUN	BDL	BDL	BDL
JUL	BDL	BDL	BDL
AUG	BDL	BDL	BDL
SEP	BDL	BDL	BDL
OCT	BDL	BDL	BDL
NOV	BDL	BDL	BDL
DEC	BDL	BDL	BDL
ETHYLBENZENE (UG/L)	)	DET'N LIMIT = 0.05	GUIDELINE = 2.4 (A3)
FEB	BDL	BDL	BDL
MAR	BDL	BDL	.150 <T
APR	BDL	BDL	BDL
MAY	BDL	.100 <T	.050 <T
JUN	BDL	BDL	BDL
JUL	BDL	BDL	.050 <T
AUG	BDL	.100 <T	BDL
SEP	BDL	BDL	BDL
OCT	BDL	BDL	BDL
NOV	BDL	.050 <T	BDL
DEC	BDL	BDL	BDL
M-XYLENE (UG/L)	)	DET'N LIMIT = 0.10	GUIDELINE = 300 (A3*)
FEB	BDL	BDL	.200 <T
MAR	BDL	BDL	BDL
APR	BDL	BDL	BDL
MAY	BDL	BDL	BDL
JUN	BDL	BDL	BDL
JUL	BDL	BDL	BDL
AUG	BDL	BDL	BDL
SEP	BDL	BDL	BDL
OCT	BDL	BDL	BDL
NOV	BDL	BDL	BDL
DEC	BDL	BDL	BDL

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM GRAVENHURST WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW

TREATED

SITE 1

STANDING

FREE FLOW

STYRENE (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 100 (D1)
FEB	BDL	BDL	.	BDL
MAR	BDL	.050 <T	.	.050 <T
APR	BDL	BDL	.	BDL
MAY	BDL	.150 <T	.	.100 <T
JUN	.050 <T	BDL	.	.050 <T
JUL	BDL	BDL	.	.100 <T
AUG	BDL	.100 <T	.	BDL
SEP	BDL	BDL	.	BDL
OCT	BDL	.050 <T	.	BDL
NOV	.100 <T	.100 <T	.	.050 <T
DEC	BDL	BDL	.	BDL

CHLOROFORM (UG/L)		DET'N LIMIT = 0.10		GUIDELINE = 350 (A1+)
FEB	BDL	82.200	.	48.700
MAR	1.700	103.700	.	82.900
APR	BDL	71.400	.	74.600
MAY	.200 <T	86.000	.	84.900
JUN	BDL	95.200	.	104.700
JUL	43.600	92.700	.	91.200
AUG	3.600	97.800	.	111.600
SEP	12.200	93.800	.	99.000
OCT	13.900	106.400	.	101.400
NOV	BDL	80.500	.	79.900
DEC	.200 <T	81.700	.	76.300

111, TRICHLOROETHANE (UG/L)		DET'N LIMIT = 0.02		GUIDELINE = 200 (D1)
FEB	BDL	BDL	.	BDL
MAR	BDL	BDL	.	BDL
APR	.080 <T	BDL	.	BDL
MAY	BDL	BDL	.	BDL
JUN	BDL	BDL	.	BDL
JUL	BDL	BDL	.	BDL
AUG	BDL	BDL	.	BDL
SEP	BDL	BDL	.	BDL
OCT	BDL	BDL	.	BDL
NOV	BDL	BDL	.	BDL
DEC	BDL	BDL	.	BDL

DICHLOROBROMOMETHANE (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 350 (A1+)
FEB	BDL	3.550	.	3.050
MAR	.100 <T	3.550	.	2.850
APR	BDL	2.800	.	2.800
MAY	BDL	2.650	.	2.550
JUN	BDL	2.600	.	2.850
JUL	1.550	2.700	.	2.600
AUG	.200 <T	3.100	.	3.250
SEP	.550	3.250	.	3.300
OCT	.700	3.200	.	2.950
NOV	BDL	2.800	.	2.800
DEC	BDL	2.850	.	2.750

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM GRAVENHURST WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED		SITE 1	
		STANDING		FREE FLOW	
CHLORODIBROMOMETHANE (UG/L)		DET'N LIMIT = 0.10		GUIDELINE = 350 (A1+)	
FEB	BDL	BDL	.	BDL	
MAR	BDL	BDL	.	BDL	
APR	BDL	BDL	.	BDL	
MAY	BDL	BDL	.	BDL	
JUN	BDL	BDL	.	BDL	
JUL	BDL	BDL	.	BDL	
AUG	BDL	BDL	.	BDL	
SEP	BDL	BDL	.	BDL	
OCT	BDL	BDL	.	BDL	
NOV	BDL	.100 <T	.	BDL	
DEC	BDL	.100 <T	.	.200 <T	
T-CHLOROETHYLENE (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 5 (D1)	
FEB	BDL	BDL	.	BDL	
MAR	BDL	BDL	.	BDL	
APR	BDL	BDL	.	BDL	
MAY	BDL	BDL	.	BDL	
JUN	BDL	BDL	.	BDL	
JUL	BDL	BDL	.	BDL	
AUG	BDL	BDL	.	.100 <T	
SEP	BDL	BDL	.	BDL	
OCT	BDL	BDL	.	BDL	
NOV	BDL	BDL	.	BDL	
DEC	BDL	BDL	.	BDL	
TOTL TRIHALOMETHANES (UG/L)		DET'N LIMIT = 0.50		GUIDELINE = 350 (A1)	
FEB	BDL	85.750	.	51.750	
MAR	1.800 <T	107.250	.	85.750	
APR	BDL	74.200	.	77.400	
MAY	BDL	88.650	.	87.450	
JUN	BDL	97.800	.	107.550	
JUL	45.150	95.400	.	93.800	
AUG	3.750 <T	100.900	.	114.850	
SEP	12.700	97.050	.	102.250	
OCT	14.550	109.650	.	104.300	
NOV	BDL	83.450	.	82.650	
DEC	BDL	84.600	.	79.200	

TRACE LEVELS OF TOLUENE ARE LABORATORY ARTIFACTS DERIVED FROM THE ANALYTICAL METHODOLOGY.

TRACE LEVELS OF STYRENE ARE CONSIDERED TO BE LABORATORY ARTIFACTS RESULTING FROM THE LABORATORY SHIPPING CONTAINERS.

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
BACTERIOLOGICAL			
FECAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	0 (A1)
STANDARD PLATE COUNT MEMBRANE FILT.	CT/ML	0	500/ML (A3)
TOTAL COLIFORM BACKGROUND MF	CT/100ML	0	N/A
TOTAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	5/100ML (A1)
CHEMISTRY (FLD)			
FIELD COMBINED CHLORINE RESIDUAL	MG/L	0	N/A
FIELD TOTAL CHLORINE RESIDUAL	MG/L	0	N/A
FIELD FREE CHLORINE RESIDUAL	MG/L	0	N/A
FIELD PH	DMNSLESS	N/A	6.5-8.5 (A3)
FIELD TEMPERATURE	DEG.C	N/A	15.0 (A3)
FIELD TURBIDITY	FTU	N/A	1.0 (A1)
CHEMISTRY (LAB)			
ALKALINITY	MG/L	0.2	30-500 (A3)
AMMONIUM TOTAL	MG/L	0.002	0.05 (F2)
CALCIUM	MG/L	0.2	100 (F2)
CHLORIDE	MG/L	0.2	250 (A3)
COLOUR	TCU	0.5	5.0 (A3)
CONDUCTIVITY	UMHO/CM	1.0	400 (F2)
CYANIDE	MG/L	0.001	0.2 (A1)
DISSOLVED ORGANIC CARBON	MG/L	0.1	5.0 (A3)
FLUORIDE	MG/L	0.01	2.4 (A1)
HARDNESS	MG/L	0.5	80-100 (A4)
LANGELIERS INDEX	DMNSLESS	N/A	N/A
MAGNESIUM	MG/L	0.1	30.0 (F2)
NITRITE	MG/L	0.001	1.0 (A1)
NITROGEN TOTAL KJELDAHL	MG/L	0.02	N/A
PH	DMNSLESS	N/A	6.5-8.5 (A4)
PHOSPHORUS FIL REACT	MG/L	0.0005	N/A
PHOSPHORUS TOTAL	MG/L	0.002	0.4 (F2)
SODIUM	MG/L	0.2	200 (A4)
SULPHATE	MG/L	0.2	500 (A3)
TOTAL NITRATES	MG/L	0.005	10.0 (A1)
TURBIDITY	FTU	0.05	1.0 (A1)
CHLOROAROMATICS			
123 TRICHLOROBENZENE	NG/L	5.0	N/A
1234 TETRACHLOROBENZENE	NG/L	1.0	N/A
1235 TETRACHLOROBENZENE	NG/L	1.0	N/A
124 TRICHLOROBENZENE	NG/L	5.0	10000 (1)
1245-TETRACHLOROBENZENE	NG/L	1.0	38000 (D4)
135 TRICHLOROBENZENE	NG/L	5.0	N/A
236 TRICHLOROTOLUENE	NG/L	5.0	N/A
245 TRICHLOROTOLUENE	NG/L	5.0	N/A
26A TRICHLOROTOLUENE	NG/L	5.0	N/A
HEXACHLOROBENZENE	NG/L	1.0	10 (C1)
HEXACHLOROBUTADIENE	NG/L	1.0	450 (D4)
HEXACHLOROCYCLOPENTADIENE	NG/L	5.0	206000 (D4)
HEXACHLOROETHANE	NG/L	1.0	1900 (D4)
OCTACHLOROSTYRENE	NG/L	1.0	N/A
PENTACHLOROBENZENE	NG/L	1.0	74000 (D4)
CHLOROPHENOLS			
234 TRICHLOROPHENOL	NG/L	100.0	N/A
2345 TETRACHLOROPHENOL	NG/L	20.0	N/A
2356 TETRACHLOROPHENOL	NG/L	10.0	N/A

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
245 TRICHLOROPHENOL	NG/L	100.0	2600000 (D4)
246 TRICHLOROPHENOL	NG/L	20.0	5000 (A1)
PENTACHLOROPHENOL	NG/L	10.0	60000 (A1)
METALS			
ALUMINUM	UG/L	0.10	100 (A4)
ANTIMONY	UG/L	0.05	146 (D4)
ARSENIC	UG/L	0.10	25 (A1)
BARIUM	UG/L	0.05	1000 (A2)
BERYLLIUM	UG/L	0.05	6800 (D4)
BORON	UG/L	2.00	5000 (A1)
CADMIUM	UG/L	0.05	5 (A1)
CHROMIUM	UG/L	0.50	50 (A1)
COBALT	UG/L	0.02	N/A
COPPER	UG/L	0.50	1000 (A3)
IRON	UG/L	6.00	300 (A3)
LEAD	UG/L	0.05	10 (A1)
MANGANESE	UG/L	0.05	50 (A3)
MERCURY	UG/L	0.02	1 (A1)
MOLYBDENUM	UG/L	0.05	N/A
NICKEL	UG/L	0.20	350 (D3)
SELENIUM	UG/L	1.00	10 (A1)
SILVER	UG/L	0.05	50 (A1)
STRONTIUM	UG/L	0.10	N/A
THALLIUM	UG/L	0.05	13 (D4)
TITANIUM	UG/L	0.50	N/A
URANIUM	UG/L	0.05	100 (A1)
VANADIUM	UG/L	0.05	N/A
ZINC	UG/L	0.20	5000 (A3)
PAH			
ANTHRACENE	NG/L	1.0	N/A
BENZO(A) ANTHRACENE	NG/L	20.0	N/A
BENZO(A) PYRENE	NG/L	5.0	10.0 (A1)
BENZO(B) CHRYSENE	NG/L	2.0	N/A
BENZO(B) FLUORANTHENE	NG/L	10.0	N/A
BENZO(E) PYRENE	NG/L	50.0	N/A
BENZO(G,H,I) PERYLENE	NG/L	20.0	N/A
BENZO(K) FLUORANTHENE	NG/L	1.0	N/A
CHRYSENE	NG/L	50.0	N/A
CORONENE	NG/L	10.0	N/A
DIBENZO(A,H) ANTHRACENE	NG/L	10.0	N/A
DIMETHYL BENZO(A) ANTHRACENE	NG/L	5.0	N/A
FLUORANTHENE	NG/L	20.0	42000.0 (D4)
INDENO(1,2,3-C,D) PYRENE	NG/L	20.0	N/A
PERYLENE	NG/L	10.0	N/A
PHENANTHRENE	NG/L	10.0	N/A
PYRENE	NG/L	20.0	N/A
PESTICIDES & PCB			
ALACHLOR (LASSO)	NG/L	500.0	5000 (A2)
ALDRIN	NG/L	1.0	700 (A1)
ALPHA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	700 (G)
ALPHA CHLORDANE	NG/L	2.0	7000 (A1)
AMETRINE	NG/L	50.0	300000 (D3)
ATRATONE	NG/L	50.0	N/A
ATRAZINE	NG/L	50.0	60000 (A2)
DES ETHYL ATRAZINE	NG/L	200.0	60000 (A2)
BETA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	300 (G)
CYANAZINE (BLADAX)	NG/L	100.0	10000 (A2)
O,P-DDD	NG/L	5.0	10 (I)
DIELDRIN	NG/L	2.0	700 (A1)
ENDOSULFAN 1 (THIODAN I)	NG/L	2.0	74000 (D4)
ENDOSULFAN 2 (THIODAN II)	NG/L	5.0	74000 (D4)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
ENDOSULFAN SULPHATE (THIODAN SULPHATE)	NG/L	5.0	N/A
ENDRIN	NG/L	5.0	1600 (D3)
GAMMA CHLORDANE	NG/L	2.0	7000 (A1)
HEPTACHLOR	NG/L	1.0	3000 (A1)
HEPTACHLOR EPOXIDE	NG/L	1.0	3000 (A1)
LINDANE (GAMMA BHC)	NG/L	1.0	4000 (A1)
METHOXYCHLOR	NG/L	5.0	900000 (A1)
METOLACHLOR	NG/L	500.0	50000 (A2)
METRIBUZIN (SENCOR)	NG/L	100.0	80000 (A1)
MIREX	NG/L	5.0	N/A
P,P-DDD	NG/L	5.0	N/A
O,P-DDT	NG/L	5.0	30000 (A1)
OXYCHLORDANE	NG/L	2.0	N/A
PCB	NG/L	20.0	3000 (A2)
PPDDE	NG/L	1.0	30000 (A1)
PPDDT	NG/L	5.0	30000 (A1)
PROMETONE	NG/L	50.0	52500 (D3)
PROMETRYNE	NG/L	50.0	1000 (A2)
PROPAZINE	NG/L	50.0	700000 (D3)
SIMAZINE	NG/L	50.0	10000 (A2)
D-ETHYL SIMAZINE	NG/L	200.0	10000 (A2)
TOXAPHENE	NG/L	500.0	5000 (A1)
PHENOLICS			
PHENOLICS (UNFILTERED REACTIVE)	UG/L	0.2	2 (A4)
SPECIFIC PESTICIDES			
2,4 D PROPIONIC ACID	NG/L	100.	N/A
2,4,5-TRICHLOROPHENOXY ACETIC ACID	NG/L	50.	280000 (A1)
2,4-DICHLOROBUTYRIC ACID (2,4-D)	NG/L	100.	100000 (A1)
2,4-DICHLOROPHENOXYBUTYRIC ACID (2,4-DB)	NG/L	200.	18000 (B3)
BUTYLATE (SUTAN)	NG/L	2000.	245000 (D3)
CARBARYL (SEVIN)	NG/L	200.	90000 (A1)
CARBOFURAN	NG/L	2000.	90000 (A1)
CHLORPYRIFOS (DURSBAN)	NG/L	20.	N/A
CICP (CHLORPROPHAM)	NG/L	2000.	350000 (G)
DIALLATE	NG/L	2000.	N/A
DIAZINON	NG/L	20.	20000 (A1)
DICAMBA	NG/L	50.	120000 (A1)
DICHLOROVOS	NG/L	20.	N/A
EPTAM	NG/L	2000.	N/A
ETHION	NG/L	20.	35000 (G)
IPC	NG/L	2000.	N/A
MALATHION	NG/L	20.	190000 (A1)
METHYL PARATHION	NG/L	50.	7000 (B3)
METHYLTRITHION	NG/L	20.	N/A
MEVINPHOS	NG/L	20.	N/A
PARATHION	NG/L	20.	50000 (A1)
PHORATE (THIMET)	NG/L	20.	2000 (A2)
PROPOXUR (BAYGON)	NG/L	2000.	140000 (D3)
RELDAN	NG/L	20.	N/A
RONNEL	NG/L	20.	N/A
SILVEX (2,4,5-TP)	NG/L	20.	10000 (A1)
VOLATILES			
1,1 DICHLOROETHANE	UG/L	0.10	N/A
1,1 DICHLOROETHYLENE	UG/L	0.10	7 (D1)
1,2 DICHLOROBENZENE	UG/L	0.05	200 (A1)
1,2 DICHLOROETHANE	UG/L	0.05	5 (A1)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
1,2 DICHLOROPROPANE	UG/L	0.05	5 (D1)
1,3 DICHLOROBENZENE	UG/L	0.10	3750 (D3)
1,4 DICHLOROBENZENE	UG/L	0.10	5 (A1)
111, TRICHLOROETHANE	UG/L	0.02	200 (D1)
112 TRICHLOROETHANE	UG/L	0.05	0.6 (D4)
1122 TETRACHLOROETHANE	UG/L	0.05	0.17(D4)
BENZENE	UG/L	0.05	5 (A1)
BROMOFORM	UG/L	0.20	350 (A1+)
CARBON TETRACHLORIDE	UG/L	0.20	5 (A1)
CHLOROBENZENE	UG/L	0.10	1510 (D3)
CHLORODIBROMOMETHANE	UG/L	0.10	350 (A1+)
CHLOROFORM	UG/L	0.10	350 (A1+)
DICHLOROBROMOMETHANE	UG/L	0.05	350 (A1+)
ETHYLENE DIBROMIDE	UG/L	0.05	50 (D1)
ETHYLBENZENE	UG/L	0.05	2.4 (A3)
M-XYLENE	UG/L	0.10	300 (A3*)
METHYLENE CHLORIDE	UG/L	0.50	50 (A1)
O-XYLENE	UG/L	0.05	300 (A3*)
P-XYLENE	UG/L	0.10	300 (A3*)
STYRENE	UG/L	0.05	100 (D1)
TETRACHLOROETHYLENE	UG/L	0.05	5 (D1)
TRANS 1,2 DICHLOROETHYLENE	UG/L	0.10	70 (D1)
TOLUENE	UG/L	0.05	24 (A3)
TOTAL TRIHALOMETHANES	UG/L	0.50	350 (A1)
TRICHLOROETHYLENE	UG/L	0.10	50 (A1)

Appendix A

DRINKING WATER SURVEILLANCE PROGRAM PROGRAM DESCRIPTION

The Drinking Water Surveillance Program (DWSP) for Ontario monitors drinking water quality at municipal water supply systems. The DWSP Database Management System provides a computerized drinking water quality information system for the supplies monitored. The objectives of the program are to provide:

- immediate, reliable, current information on drinking water quality;
- a flagging mechanism for guideline exceedance;
- a definition of contaminant levels and trends;
- a comprehensive background for remedial action;
- a framework for assessment of new contaminants; and
- an indication of treatment efficiency of plant processes.

PROGRAM

The DWSP officially began in April 1986 and is designed to eventually include all municipal water supplies in Ontario. In 1990, 76 systems were being monitored. Water supply locations have been prioritized for surveillance based primarily on criteria such as population density, probability of contamination and geographical location.

An ongoing assessment of future monitoring requirements at each location will be made. Monitoring will continue at the initial locations at an appropriate level and further locations will be phased into the program as resources permit.

A major goal of the program is to collect valid water quality data in context with plant operational characteristics at the time of sampling. As soon as sufficient data have been accumulated and analyzed, both the frequency of sampling and the range of parameters may be adjusted accordingly.

Assessments are carried out at all locations prior to initial sampling, in order to acquire complete plant process and distribution system details and to designate (and retrofit if necessary) all sampling systems and locations. This ensures that the sampled water is a reflection of the water itself.

Samples are taken of raw (ambient water) and treated water at the treatment plant and of consumer's tap water in the distribution system. In order to determine possible effects of distribution on water quality, both standing and free flow water in old and new sections of the distribution system are sampled. Sampling is carried out by operational personnel who have been trained in applicable procedures.

Comprehensive standardized procedures and field test kits are supplied to sampling personnel. This ensures that samples are taken and handled according to standard protocols and that field testing will supply reliable data. All field and laboratory analyses are carried out using "approved documented procedures". Most laboratory analyses are carried out by the Ministry of Environment (MOE), Laboratory Services Branch. Radionuclides are analyzed by the Ministry of Labour.

DATA REPORTING MECHANISM

When the analytical results are transferred from the MOE laboratory into the DWSP system, printouts of the completed analyses are sent to the MOE District Officer, the appropriate operational staff and are also retained by the DWSP unit.

PROGRAM INPUTS AND OUTPUTS

There are four major inputs and four major outputs in the program.

Program Input - Plant and Distribution System Description

The system description includes plant specific non-analytical information acquired through a questionnaire and an initial plant visit. During the initial assessment of the plant and distribution system, questionnaire content is verified and missing information added. It is intended that all data be kept current with scheduled annual updates.

The Plant and Distribution System Description consists of the following seven components:

1. PROCESS COMPONENT INVENTORY

All physical and chemical processes to which the water is subjected, from the intake pipe to the consumers' tap (where possible), are documented. These include: process type, general description of physical structures, material types, sizes, and retention time for each process within the plant. The processes may be as simple as transmission or as complex as carbon adsorption.

2. TREATMENT CHEMICALS

Chemicals used in the treatment processes, their function, application point, supplier and brand-name are recorded. Chemical dosages applied on the day of sampling are recorded in DWSP.

3. PROCESS CONTROL MEASUREMENTS

Documentation of in-plant monitoring of process parameters (eg. turbidity, chlorine residuals, pH, aluminum residuals) including methods used, monitoring locations and frequency is contained in this section. Except for the recorded Field Data, in-plant monitoring results are not retained in DWSP but are retained by the water treatment plant personnel.

4. DESIGN FLOW AND RETENTION TIME

Hydraulic capacity, designed and actual, is noted here. Retention time (the time that a block of water is retained in the plant) is also noted. Maximum, minimum and average flow, as well as a record of the flow rate on the day of sampling, are recorded in DWSP.

5. DISTRIBUTION SYSTEM DESCRIPTION

This area includes the storage and transmission characteristics of the distribution system after the water leaves the plant.

6. SAMPLING SYSTEM

Each plant is assessed for its adequacy in terms of the sampling of bacteriological, organic and inorganic parameters. Prime considerations in the assessment and design of the sampling system are:

- i/ the sample is an accurate representation of the actual water condition, eg. raw water has had no chemical treatment;
- ii/ the water being sampled is not being modified by the sampling system;
- iii/ the sample tap must be in a clean area of the plant, preferably a lab area; and
- iv/ the sample lines must be organically inert (no plastic, ideally stainless steel).

It is imperative that the sampled water be a reflection not of the sampling system but of the water itself.

The sampling system documentation includes: origin of the water; date sampling was initiated; size, length and material type (intake,

discharge and tap); pump characteristics (model, type, capacity); and flow rate.

7. PERSONNEL

This section contains the names, addresses and phone numbers of current plant management and operational staff, distribution system management and operational staff, Medical Officer of Health and appropriate MOE personnel associated with the plant.

Program Input - Field Data

The second major input to DWSP is field data. Field data is collected at the plant and from the distribution system sites on the day of sampling. Field data consists of general operating conditions and the results of testing for field parameters. General operating conditions include chemicals used, dosages, flow and retention time on the day of sampling, as well as, monthly maximum, minimum and average flows. Field parameters include turbidity, chlorine residuals (free, combined and total), temperature and pH. These parameters are analyzed according to standardized DWSP protocols to allow for interplant comparison.

Program Input - Laboratory Analytical Data

The third major input to DWSP is Laboratory Analytical Data. Samples gathered from the raw, treated and distribution sampling sites are analyzed for the presence of approximately 180 parameters at a frequency of two to twelve times per year. Sixty-five percent of the parameters are organic. Parameters measured may have health or aesthetic implications when present in drinking water. Many of the parameters may be used in the treatment process or may be treatment by-products. Due to the nature of certain analytical instruments, parameters may be measured in a "scan" producing some results for parameters that are not on the DWSP priority list, but which may be of interest. The majority of parameters are measured on a routine basis. Those that are technically more difficult and/or costly to analyze, however, are done less frequently. These include Specific Pesticides and Chlorophenols.

Although the parameter list is extensive, additional parameters with the potential to cause health or aesthetic related problems may be added provided reliable analytical and sampling methods exist.

All laboratory generated data is derived from standardized, documented analytical protocols. The analytical method is an integral part of the data and as methods change, notation will be made and comparison data documented.

Program Input - Parameter Reference Information

The fourth major input to DWSP is Parameter Reference Information. This is a catalogue of information for each substance analyzed on DWSP. It includes parameter name and aliases, physical and chemical properties, basic toxicology, world-wide health limits, treatment methods and uses. The Parameter Reference Information is computerized and can be accessed through the Query function of the DWSP database. An example is shown in figure 1.

Program output - Query

All DWSP information is easily accessed through the Query function, therefore, anything from addresses of plant personnel to complete water quality information for a plant's water supply is instantly available. The DWSP computer system makes relatively complex inquiries manageable. A personal password allowing access into the DWSP query mode in all MOE offices is being developed by the DWSP group.

Program Output - Action Alerts

Drinking Water quality in Ontario is evaluated against provincial objectives as outlined in the Ontario Drinking Water Objectives publication. Should the reported level of a substance in treated water exceed the Ontario Drinking Water Objective, an "Action Alert" requiring resampling and confirmation is issued. This assures that operational staff, health authorities and the public are notified as soon as possible of the confirmation of an exceedance and remedial action taken. This report supplies a history of the occurrence of past exceedances at the plant plus a historical summary on the parameter of concern.

In the absence of Ontario Drinking Water Objectives, guidelines/limits from other agencies are used. The Parameter Listing System, published by MOE (ISBN 0-7729-4461-X), catalogues and keeps current guidelines for 650 parameters from agencies throughout the world. If these guidelines are exceeded, the results are flagged and evaluated by DWSP personnel. An "Action Alert" will be issued if warranted.

Program Output - Report Generation

Custom reports can be generated from DWSP to meet MOE Regional needs and to respond to public requests.

Program Output - Annual Reports

It is the practice of DWSP to produce an annual report containing analytical data along with companion plant information.

FIG.1

MOE - DRINKING WATER ASSESSMENT PROGRAM (DWSP)

PARAMETER REFERENCE INFORMATION

BENZENE (B2001P)

VOLATILES

CLASS: HEALTH METHOD: POCODO UNIT: $\mu\text{g/L}$

SOURCE	FROM	TO	METHOD	GUIDELINE	UNIT	NOTE
CAL C	85/01			0.700	$\mu\text{g/L}$	AL
CDWG C	87/01			5.000	$\mu\text{g/L}$	MAC
EPA C	87/07			5.000	$\mu\text{g/L}$	MCL
EPAA C	80/11			6.600	$\mu\text{g/L}$	AMBIENT **
FERC C	84/05			1.000	$\mu\text{g/L}$	MCL
WHO C	84/01			10.000	$\mu\text{g/L}$	GV

DESCRIPTION:NAME: BENZENE

CAS#: 71-43-2

MOLECULAR FORMULAE: C_6H_6

DETECTION LIMIT: (FOR METHOD POCODO) $0.05 \mu\text{g/L}$

SYNONYMS: BENZOL; BENZOLE; COAL NAPHTHA; CARBON OIL (27).
CYCLOHEXATRIENE (41).

CHARACTERISTICS: COLOURLESS TO LIGHT-YELLOW, MOBILE, NON-POLAR LIQUID, OF HIGHLY REFRACTIVE NATURE, AROMATIC ODOUR; VAPOURS BURN WITH SMOKING FLAME (30).

PROPERTIES: SOLUBILITY IN WATER: 1780-1800 mg/L AT 25C (41).
THRESHOLD ODOUR: 0.5 - 10 PPM IN WATER
THRESHOLD TASTE: 0.5 mg/L IN WATER (39).

ENVIRONMENTAL FATE: MAY BIOACCUMULATE IN LIVING ORGANISMS AND APPEARS TO ACCUMULATE IN ANIMAL TISSUES THAT EXHIBIT A HIGH LIPID CONTENT OR REPRESENT MAJOR METABOLIC SITES, SUCH AS LIVER OR BRAIN; SMALL QUANTITIES EVAPORATE FROM SOILS OR ARE DEGRADED RATHER QUICKLY (80).

SOURCES: COMMERCIAL: PETROLEUM REFINING; SOLVENT RECOVERY; COAL TAR DISTILLATION (39); FOOD PROCESSING AND TANNING INDUSTRIES; COMBUSTION OF CAR EXHAUST.
ENVIRONMENTAL: POSSIBLE SOURCE IS RUNOFF.

USES: DETERGENTS; NYLON; INTERMEDIATE IN PRODUCTION OF OTHER COMPOUNDS, SUCH AS PESTICIDES; SOLVENT FOR EXTRACTION AND RECTIFICATION IN RUBBER INDUSTRY; DEGREASING AND CLEANSING AGENT; GASOLINE.

TOXICITY: RATING: 4 (VERY TOXIC).

ACUTE: IRRITATING TO MUCOUS MEMBRANES; SYMPTOMS INCLUDE RESTLESSNESS, CONVULSIONS, EXCITEMENT, DEPRESSION; DEATH MAY FOLLOW RESPIRATORY FAILURE.
CHRONIC: MAY CAUSE ANAEMIA AND LEUKAEMIA (45);
MUTAGENIC.

MODE OF ACTION: CHROMOABERRATION IN LYMPHOCYTE CULTURES.

CARCINOGENICITY: A KNOWN HUMAN CARCINOGEN.

REMOVAL: THE FOLLOWING PROCESSES HAVE BEEN SUCCESSFUL IN REMOVING BENZENE FROM WASTEWATER: GAC ADSORPTION, PRECIPITATION WITH ALUM AND SUBSEQUENT REMOVAL VIA SEDIMENTATION, COAGULATION AND FLOCCULATION, SOLVENT EXTRACTION, OXIDATION

ADDITIONAL PROPERTIES:

MOLECULAR WEIGHT: 78.12

MELTING POINT: 5.5°C (27).

BOILING POINT: 80.1°C (27).

SPECIFIC GRAVITY: 0.8790 AT 20°C (27).

VAPOUR PRESSURE: 100 MM AT 26.1°C (27).

HENRY'S LAW CONSTANT: 0.00555 ATM-M³/MOLE (41).

LOG OCT./WATER PARTITION COEFFICIENT: 1.95 TO 2.13 (39).

CARBON ADSORPTION: K=1.0; 1/N=1.6; R=0.97; PH=5.3 (41) SEDIMENT/WATER PARTITION COEFFICIENT: NO DATA

NOTES: EPA PRIORITY POLLUTANT.

Appendix B

DWSP SAMPLING GUIDELINE

i) Raw and Treated at Plant

General Chemistry

- 500 mL plastic bottle (PET 500)
- rinse bottle and cap with sample water three times
- fill to 2 cm from top

Bacteriological

- 220 mL plastic bottle with white seal on cap
- do not rinse bottle, preservative has been added
- avoid touching bottle neck or inside of cap
- fill to top of red label as marked

Metals

- 500 mL plastic bottle (PET 500)
- rinse bottle and cap three times
- fill to 2 cm from top
- add 10 drops nitric acid (HNO_3)
(Caution: HNO_3 is corrosive)

Volatiles (duplicates) (OPOPUP)

- 45 mL glass vial with septum (teflon side must be in contact with sample)
- do not rinse bottle
- fill bottle completely without bubbles

Organics (OWOC), (OWTRI), (OAPAHX)

- 1 L amber glass bottle per scan
- do not rinse bottle
- fill to 2 cm from top
- when 'special pesticides' are requested three extra bottles must be filled

Cyanide	<ul style="list-style-type: none"> -500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops sodium hydroxide (NaOH) (Caution: NaOH is corrosive)
Mercury	<ul style="list-style-type: none"> -250 mL glass bottle -rinse bottle and cap three times -fill to top of label -add 20 drops each nitric acid (HNO_3) and potassium dichromate ($\text{K}_2\text{Cr}_2\text{O}_7$) (Caution: HNO_3 & $\text{K}_2\text{Cr}_2\text{O}_7$ are corrosive)
Phenols	<ul style="list-style-type: none"> -250 mL glass bottle -do <u>not</u> rinse bottle, preservative has been added -fill to top of label
Radionuclides (as scheduled)	<ul style="list-style-type: none"> -4 L plastic jug -do <u>not</u> rinse, carrier added -fill to 5 cm from top
Organic Characterization (GC/MS - once per year)	<ul style="list-style-type: none"> -1 L amber glass bottle; instructions as per organic -250 mL glass bottle -do <u>not</u> rinse bottle -fill completely without bubbles

Steps:

1. Let sampling water tap run for an adequate time to clear the sample line.
2. Record time of day on submission sheet.
3. Record temperature on submission sheet.
4. Fill up all bottles as per instructions.
5. Record chlorine residuals (free, combined and total for treated water only), turbidity and pH on submission sheet.

ii) Distribution Samples (standing water)

General Chemistry

- 500 mL plastic bottle (PET 500)
- rinse bottle and cap with sample water three times
- fill to 2 cm from top

Metals

- 500 mL plastic bottle (PET 500)
- rinse bottle and cap three times
- fill to 2 cm from top
- add 10 drops nitric acid (HNO_3)
(Caution: HNO_3 is corrosive)

Steps:

1. Record time of day on submission sheet.
2. Place bucket under tap and open cold water.
3. Fill to predetermined volume.
4. After mixing the water, record the temperature on the submission sheet.
5. Fill general chemistry and metals bottles.
6. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

iii) Distribution Samples (free flow)

General Chemistry

- 500 mL plastic bottle (PET 500)
- rinse bottle and cap with sample water three times
- fill to 2 cm from top

Bacteriological

- 250 mL plastic bottle with white seal on cap
- do not rinse bottle, preservative has been added
- avoid touching bottle neck or inside of cap
- fill to top of red label as marked

Metals

- 500 mL plastic bottle (PET 500)
- rinse bottle and cap three times
- fill to 2 cm from top
- add 10 drops nitric acid HNO_3
(Caution: HNO_3 is corrosive)

Volatiles (duplicate)
(OPOPUP)

- 45 mL glass vial with septum
(teflon side must be in contact
with sample)
- do not rinse bottle, preservative
has been added
- fill bottle completely without
bubbles

Organics
(OWOC) (OAPAHX)

- 1 L amber glass bottle per scan
- do not rinse bottle
- fill to 2 cm from top

Steps:

1. Record time of day on submission sheet.
2. Let cold water flow for five minutes.
3. Record temperature on submission sheet.
4. Fill all bottles as per instructions.
5. Record chlorine residuals (free, combined and total),
turbidity and pH on submission sheet.

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1992**

Gravenhurst water treatment
plant : annual report 1990.
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